

D. Qi, W. Chunlin, T. Yanfang, Z. Jianting and W. Jiwei, "The impact analysis based on gray correlation of sedimentary water in bottom corrosion of oil tank," *2013 10th International Computer Conference on Wavelet Active Media Technology and Information Processing (ICCWAMTIP)*, Chengdu, 2013, pp. 139-142.

doi: 10.1109/ICCWAMTIP.2013.6716617

Abstract: The theoretical basis of this paper is the gray relational analysis theory. By factor analysis method, we obtain five main factors: sulfide content, carbonate content, chlorine ion content, sulfate ion content and PH, which are proposed in [1]. Through calculating the correlation coefficient and gray relational degree, we get the corrosion effect evaluation of sedimentary water to the bottom of a tank. It's meaningful for tank design and corrosion protection.

keywords: {corrosion protection;design engineering;fuel storage;grey systems;oil technology;pH;sediments;tanks (containers);carbonate content;chlorine ion content;correlation coefficient;corrosion effect evaluation;corrosion protection;factor analysis method;gray correlation;gray relational analysis theory;gray relational degree;oil tank bottom;pH;sedimentary water;sulfate ion content;sulfide content;tank design;Correlation;Correlation coefficient;Corrosion;Educational institutions;Electronic mail;Fuel storage;Steel;corrosion factor;corrosion protection;gray relational analysis theory;oil tank},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6716617&isnumber=6716587>

N. Okada, S. Yabe, H. Fujimoto and M. Murai, "Experiments on floating wave-power generation using piezoelectric elements and pendulums in the water tank," *2012 Oceans - Yeosu*, Yeosu, 2012, pp. 1-8.

doi: 10.1109/OCEANS-Yeosu.2012.6263603

Abstract: In late years, the action for the environmental problem becomes more and more active in the world. The country like Japan, being surrounded by the sea, is rich in ocean energy. It is relatively easy to get wave energy among ocean renewable energies. The wave power generation device to collect wave energy has been studied in many countries of the world including Japan. There are a lot of electrical generating systems which use a turbine. But, the environment in ocean is different from that in land. Because the turbine is weak in ocean breeze, it is more difficult to maintain it. Therefore we proposed a new electrical generating system, which doesn't use a turbine, using the piezoelectric element and pendulums.

keywords: {ocean waves;pendulums;piezoelectric devices;tanks (containers);turbines;wave power generation;Japan;electrical generating systems;environmental problem;floating wave-power generation;ocean breeze;ocean energy;pendulums;piezoelectric elements;renewable energies;water tank;wave energy;Capacitors;Educational institutions;Oceans;Piezoelectric effect;Piezoelectric films;Vibrations;floating structure;pendulum;piezoelectric;wave power},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6263603&isnumber=6263358>

A. B. Thompson and J. K. W. Lam, "Water run-off in aircraft fuel tanks," in *IMA Journal of Applied Mathematics*, vol. 77, no. 1, pp. 72-85, Feb. 2012.

doi: 10.1093/imat/hxr077

Abstract: When warm humid air enters an aircraft fuel tank, condensation will occur on surfaces that are colder than the dew point. These surfaces can include the tank ceiling, vertical and sloping walls and the air/fuel free surface. The microscopic water droplets deposited by condensation will eventually make their way to the fuel tank sump under the competing influences of gravity and surface tension.

Accumulated water in fuel tanks can lead to fuel contamination and must be drained from the sump on a regular basis. One proposed method to improve the efficiency of water drainage to the sump is to use hydrophobic coatings on the walls of the tank. Hydrophobic coatings should reduce the critical size of water droplets pinned to the surface and increase the runoff speed of drops once in motion. We discuss experiments to measure these critical sizes and runoff speeds on different surfaces and compare the results to predictions from simple theoretical models of drop run-off. In order to predict the overall effect of the hydrophobic surface coatings on water migration through the tank, the movement of water drops through the fuel layer should also be taken into account. Here, we discuss possible interactions between fuel and water drops. We show that very small water drops can float, hanging from the fuel free surface. Drops running down a rigid surface which meet the fuel free surface undergo a transition into the fuel layer that involves detachment from the rigid wall and sometimes the formation of satellite drops.

keywords: {condensation;floating drops;water run-off},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8132905&isnumber=8132898>

C. J. Emeana *et al.*, "The thermal regime around buried submarine high-voltage cables," in *Geophysical Journal International*, vol. 206, no. 2, pp. 1051-1064, March 2016.

doi: 10.1093/gji/ggw195

Abstract: The expansion of offshore renewable energy infrastructure and the need for trans-continental shelf power transmission require the use of submarine high-voltage (HV) cables. These cables have maximum operating surface temperatures of up to 70 °C and are typically buried 1–2 m beneath the seabed, within the wide range of substrates found on the continental shelf. However, the heat flow pattern and potential effects on the sedimentary environments around such anomalously high heat sources in the near-surface sediments are poorly understood. We present temperature measurements from a 2-D laboratory experiment representing a buried submarine HV cable, and identify the thermal regimes generated within typical unconsolidated shelf sediments—coarse silt, fine sand and very coarse sand. We used a large (2 × 2.5 m²) tank filled with water-saturated spherical glass beads (ballotini) and instrumented with a buried heat source and 120 thermocouples to measure the time-dependent 2-D temperature distributions. The observed and corresponding Finite Element Method simulations of the steady state heat flow regimes and normalized radial temperature distributions were assessed. Our results show that the heat transfer and thus temperature fields generated from submarine HV cables buried within a range of sediments are highly variable. Coarse silts are shown to be purely conductive, producing temperature increases of >10 °C up to 40 cm from the source of 60 °C above ambient; fine sands demonstrate a transition from conductive to convective heat transfer between cf. 20 and 36 °C above ambient, with >10 °C heat increases occurring—over a metre from the source of 55 °C above ambient; and very coarse sands exhibit dominantly convective heat transfer even at very low (cf. 7 °C) operating temperatures and reaching temperatures of up to 18 °C above ambient at a metre from the source at surface temperatures of only 18 °C. These findings are important for the surrounding near-surface environments experiencing such high temperatures and may have significant implications for chemical and physical processes operating at the grain and subgrain scale; biological activity at both microfaunal and macrofaunal levels; and indeed the operational performance of the cables themselves, as convective heat transport would increase cable current ratings, something neglected in existing standards.

keywords: {Heat flow;Heat generation and transport;Permeability and porosity},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8189072&isnumber=8189042>

J. Barrière, C. Bordes, D. Brito, P. Sénéchal and H. Perroud, "Laboratory monitoring of P waves in partially saturated sand," in *Geophysical Journal International*, vol. 191, no. 3, pp. 1152-1170, Dec. 2012.

doi: 10.1111/j.1365-246X.2012.05691.x

Abstract: Energy dissipation is observed on seismic data when a wave propagates through a porous medium, involving different frequency regimes depending on the nature of rock and fluid types. We focus here on the role of partial fluid saturation in unconsolidated porous media, looking in particular at P-wave phase velocity and attenuation. The study consists in running an experiment in a sand-filled tank partially saturated with water. Seismic propagation in the tank is generated in the kHz range by hitting a steel ball on a granite plate. Seismic data are recorded by buried accelerometers and injecting or extracting water controls the partial saturation. Several imbibition/drainage cycles were performed between the water and gas residual saturations. A Continuous Wavelet Transform applied on seismic records allowed us to extract the direct P wave at each receiver. We observe an hysteresis in phase velocities and inverse quality factors between imbibition and drainage. Phase velocities and inverse quality factors are then jointly inverted to get a final poro-viscoelastic model of the partially saturated sand that satisfactorily reproduces the data. The model formulation consists in generalizing the Biot theory to effective properties of the fluid and medium (permeability and bulk modulus) to properly explain the phase velocity variation as a function of the saturation. The strong level of attenuation measured experimentally is further explained by an anelastic effect due to grain to grain sliding, adding to Biot's losses. This study shows that fluid distribution at microscopic scale has strong influence on the attenuation of direct P waves at macroscopic scale and confirms that seismic prospecting may be a powerful tool for the characterization of transport phenomena in porous media.

keywords: {Hydrogeophysics;Seismic attenuation;Wave propagation},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8214441&isnumber=8214422>

O. L. Osen, R. I. Sandvik, J. Berge Trygstad, V. Rogne and H. Zhang, "A novel low cost ROV for aquaculture application," *OCEANS 2017 - Anchorage*, Anchorage, AK, 2017, pp. 1-7.

Abstract: Marine aquaculture is deeply rooted in Norwegian national economics and traditions, especially in the Møre og Romsdal region. This paper presents the development of a novel ROV for aquaculture inspection in marine application to provide first-hand information in fishery nets. The ROV is a part of so called "Sea Farm" project. When the ROV doesnot work, it will be carried by a floating platform. A winch on the platform could lift the ROV down to the sea water and lift it out of water after operation. The basic concept of this ROV is low-cost, built with off-shelf and easily manufactured components. There are three wings on the body part. One thruster is embedded into each wing to provide the propulsion. Based on the cooperation of three thrusters, the ROV has omnidirectional movement capability. A serial tests in the water tank were implemented including motion comparison, speed and turning tests to verify the concept and its propulsion mechanisms. In the end, conclusions and future work are given.

keywords: {aquaculture;oceanographic techniques;remotely operated vehicles;Møre og Romsdal region;Norwegian national economics;Sea Farm project;aquaculture application;aquaculture inspection;fishery nets;low cost ROV;marine application;marine aquaculture;sea water;Aquaculture;Buoyancy;Cameras;Monitoring;Robots;Temperature sensors;Concept design;ROV;marine aquaculture applications;motion control},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8232180&isnumber=8232037>

A. A. Sarangdhar and V. R. Pawar, "Machine learning regression technique for cotton leaf disease detection and controlling using IoT," *2017 International conference of Electronics, Communication and Aerospace Technology (ICECA)*, Coimbatore, 2017, pp. 449-454.

doi: 10.1109/ICECA.2017.8212855

Abstract: Cotton is one of the most important cash crops in India. Every year the production of cotton is reducing due to the attack of the disease. Plant diseases are generally caused by pest insect and pathogens and decrease the productivity to large-scale if not controlled within time. This paper presents a system for detection and controlling of diseases on cotton leaf along with soil quality monitoring. The work proposes a Support Vector Machine based regression system for identification and classification of five cotton leaf diseases i.e. Bacterial Blight, Alternaria, Gray Mildew, Cereospra, and Fusarium wilt. After disease detection, the name of a disease with its remedies will be provided to the farmers using android app. The Android App is also used to display the soil parameters values such as humidity, moisture and temperature along with the water level in a tank. By using Android app farmers can ON/OFF the relay to control the motor and sprinkler assembly according to need. All this leaf disease detection system and sensors for soil quality monitoring are interfaced using Raspberry Pi which make it independent and cost effective system. The overall classification accuracy of this proposed system is 83.26%.

keywords: {Android (operating system);agriculture;cotton;crops;learning (artificial intelligence);microorganisms;mobile computing;plant diseases;regression analysis;soil;support vector machines;Alternaria;Android application farmers;Bacterial Blight;Cereospra;Fusarium wilt;Gray Mildew;cash crops;cotton leaf disease detection;leaf disease detection system;machine learning regression technique;pathogens;pest insect;plant diseases;soil parameter values;soil quality monitoring;support vector machine based regression system;Cotton;Diseases;Feature extraction;Image color analysis;Microorganisms;Sensors;Soil;Android App;Color Moment;Color Transform;Cotton Leaf Disease;Gabor Filter;Median Filter;Raspberry Pi;Sensors;Support Vector Machine},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8212855&isnumber=8212707>

B. Issam, A. Issam and B. Hamza, "Design of gray wolf optimizer for improving photovoltaic — Hydrogen hybrid system," *2017 5th International Conference on Electrical Engineering - Boumerdes (ICEE-B)*, Boumerdes, 2017, pp. 1-5.

doi: 10.1109/ICEE-B.2017.8192027

Abstract: This paper present an optimal photovoltaic-hydrogen standalone power system using gray wolf optimizer technique. The system composed of photovoltaic generator and a hydrogen production system. Electrical power from solar conversion meets the user loads and the surplus used for water electrolysis to produce hydrogen. Control system is ensured via feed bucks control loops. MPP Tracking regulates with PI controller for solar system and a cascade control loop with PIDs controllers for fuel system. The proposed optimization process using gray wolf optimizer contains an off-line optimization of system PIDs gains and an on-line optimization to developing an adaptive MPPT algorithm. Simulation results prove that the proposed power system with the optimization process enables to convert the total generated solar power, to control the hydrogen tank level and, get involved the fuel cell to the deficit power demands. keywords: {PI control;cascade control;electrolysis;fuel cells;hybrid power systems;hydrogen production;maximum power point trackers;optimisation;photovoltaic power systems;power generation control;three-term control;PID controllers;adaptive MPPT algorithm;cascade control loop;control system;deficit power demands;electrical power;fuel system;gray wolf optimizer

technique;hydrogen production system;hydrogen tank level;photovoltaic generator;photovoltaic-hydrogen hybrid system;photovoltaic-hydrogen standalone power system;solar conversion;solar power;solar system;water electrolysis;Control systems;Fuels;Hydrogen;Optimization;Photovoltaic systems;Power systems;MPP Tracking;control system;gray wolf optimizer;objective function;photovoltaic-hydrogen hybrid system},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8192027&isnumber=8191962>

A. Cataldo, E. De Benedetto, G. Cannazza, E. Piuze and E. Pittella, "TDR-Based Measurements of Water Content in Construction Materials for In-the-Field Use and Calibration," in *IEEE Transactions on Instrumentation and Measurement*, vol. 67, no. 5, pp. 1230-1237, May 2018.

doi: 10.1109/TIM.2017.2770778

Abstract: In this paper, a time domain reflectometry (TDR)-based system for measuring water content of raw construction materials is presented. The proposed system relies on the fact that the presence of water leads to an increase of the dielectric permittivity of materials; therefore, from TDR-based permittivity measurements, it is possible to infer the water content value. In practical applications, the proposed system could be used for assessing the intrinsic water content of construction materials before they are poured into the concrete mixture. Knowing the intrinsic water content of the raw materials, in fact, would allow to evaluate the optimal amount of water that should be added to the mixture in order to achieve the desired water-to-cement ratio. This, in turn, would permit to fine-tune and control the mechanical properties of the final concrete structures. For assessing the feasibility of using the proposed system for the intended purpose, water content measurements were carried out on three construction materials, namely, sand, gray cement, and white portland cement. For each of these materials, a calibration curve relating water content to the apparent dielectric permittivity was derived; additionally, through repeated measurements, also a confidence interval was associated with the calibration curves.

keywords: {calibration;cements (building materials);concrete;moisture measurement;permittivity measurement;quality control;sand;time-domain reflectometry;gray cement;permittivity measurements;raw construction materials;sand;time domain reflectometry;water content TDR-based measurements;water-to-cement ratio;white Portland cement;Calibration;Concrete;Dielectrics;Monitoring;Permittivity measurement;Probes;Cement;dielectric permittivity;reflection coefficient;time domain reflectometry (TDR);water content},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8119894&isnumber=8332003>

M. Gerrits, T. H. Badewlen, A. Braun, G. Behrens, H. Nicolai and O. Zielinski, "APMOS: An autonomous profiling measurement system for the ocean surface boundary layer," *OCEANS 2017 - Aberdeen*, Aberdeen, 2017, pp. 1-6.

doi: 10.1109/OCEANSE.2017.8084855

Abstract: The ocean surface is a boundary layer between atmosphere and ocean. It is highly relevant for the exchange of momentum, radiation, gas and water molecules. To get a better understanding of the exchange processes through the ocean surface APMOS, an autonomous profiling measurement system for the ocean surface boundary layer, was developed. APMOS profiles the undisturbed water column aside from a research vessel and consists of a floating body as well as a profiler. Both bodies are connected through a cable and drifting passively with the water current. System parameters of the profiler like depth, position and inclination can be recorded wirelessly and the user can configure the dive depth in real time. The profiler is equipped with a CTD (Conductivity, Temperature, and Depth) sensor and due to its modular design other sensors can also be mounted. To achieve positive or negative buoyancy the profiler is equipped with two piston tanks. The APMOS was successfully tested in the Jade Bay (southern North Sea). The profiler descends with 0,2 m/s and rises with 0,1 m/s in a relative stable position with a maximum tilt of 10 degrees. Compared with other common measurement systems these rates are slower thus preventing from mixing through platform movement. The CTD sensor is installed as upward looking and performs measurements even through the ocean surface. Overall the system is inexpensive, weighs 20 kg and can be easily handled by one person. Data shown represent novel results from the first testing phase.

keywords: {ocean waves;oceanographic equipment;oceanographic regions;oceanographic techniques;Jade Bay;atmosphere;autonomous profiling measurement system;floating body;inclination;modular design;negative buoyancy;ocean surface APMOS;ocean surface boundary layer;ocean surface boundary layer;;platform movement;research vessel;southern North Sea;undisturbed water column;water current;water molecules;Microcontrollers;Ocean temperature;Pistons;Radio frequency;Sea measurements;Sea surface;North Sea;autonomous vertical profiler;ocean surface boundary layer (OSBL);surface gradient},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8084855&isnumber=8084562>

J. Cui, R. Bachmayer, B. deYoung and W. Huang, "Motion compensation of K-band radar ocean wave measurement," *OCEANS 2017 - Aberdeen*, Aberdeen, 2017, pp. 1-7.

doi: 10.1109/OCEANSE.2017.8084847

Abstract: Along with practicing the ocean wave measurement using K-band short-range radar, the impact of radar motion caused by a floating platform cannot be ignored. Radar motion needs to be compensated because the measurement method is based on sensing water particle motion which is apt to be influenced by radar motion. In this paper, motion compensation methods are proposed. Spectral difference method and mechanical method are designed to compensate linear motion and rotation motion respectively. The spectral difference method is evaluated using numerical simulation and then both of the two methods are validated in a wave tank. Wave period and height can be precisely measured in the numerical simulation and the wave tank experiment. The results prove that the radar motion impacts are successfully mitigated by the proposed motion compensation methods.

keywords: {geophysical image processing;marine radar;motion compensation;motion measurement;numerical analysis;ocean waves;oceanographic techniques;radar imaging;remote sensing by radar;K;K-band radar ocean wave measurement method;K-band short-range radar;floating platform;linear motion compensation;mechanical method;motion compensation methods;numerical simulation;radar motion impacts;rotation motion compensation;spectral difference method;water particle motion sensing;wave tank experiment;K-band;Ocean waves;Radar cross-sections;Sea measurements;Transceivers},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8084847&isnumber=8084562>

S. Chakraborty, N. Mandal, S. C. Bera, S. K. Bera and M. Chattopadhyay, "An innovative method for the measurement of liquid level of a conducting liquid," *2016 International Conference on Computer, Electrical & Communication Engineering (ICCECE)*, Kolkata, 2016, pp. 1-5.

doi: 10.1109/ICCECE.2016.8009594

Abstract: Accurate measurement of liquid level in a storage tank is an essential requirement of any process plant. Various conducting liquids like tape water, acid solution alkali solution etc. are stored in storage tanks. Measurement of liquid level in these tanks may be

done by various techniques such as float type, displacer type, capacitance type etc. In the present paper an accurate non-contact capacitance type technique is described. In this technique measurement errors due to stray capacities effect atmospheric effect, parasitic effect, perpendicular plate capacitance effect etc. observed in conventional capacitive techniques are eliminated. Due to these effects, the conventional capacitance type level transducers require frequent recalibration. This difficulty is avoided in the proposed technique. From the experimental study of the proposed transducer. it is found to have a linear characteristic with minimum measurement error.

keywords: {level measurement;precision engineering;tanks (containers);conducting liquid;liquid level measurement;measurement error;storage tank;Atmospheric measurements;Bridge circuits;Capacitance;Liquids;Measurement errors;Transducers;Windings;Accurate measurement;Capacitive sensor;Conducting liquid;Linearity;Repeatability;level},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8009594&isnumber=8009534>

M. Vogt and M. Gerding, "Silo and Tank Vision: Applications, Challenges, and Technical Solutions for Radar Measurement of Liquids and Bulk Solids in Tanks and Silos," in *IEEE Microwave Magazine*, vol. 18, no. 6, pp. 38-51, Sept.-Oct. 2017.

doi: 10.1109/MMM.2017.2711978

Abstract: In today's industrialized world, the handling of raw materials and goods is an essential part of the supply chain. Liquids-for example water, oil, chemicals, pharmaceutical products, and liquefied gases-are stored in tanks. Bulk solids, on the other hand, are stored in silos and cover a very large variety of materials. Examples include finely granulated substances (grains, powders, sand, plastic pellets, and so forth) and also very rough materials like stones, coal, and others. The operator of a storage system is, in either case, interested in measuring the filling volume to be able to plan removal and refilling-which is important to ensure the continuous production and delivery of materials on schedule.

keywords: {CW radar;FM radar;bulk storage;supply chains;bulk solids;continuous production;radar measurement;raw materials;storage system;supply chain;Antenna measurements;Level measurement;Microwave measurement;Radar antennas;Radar measurements;Radar tracking},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8003618&isnumber=8003574>

I. Fujita, "Bubble curtain for blocking spilled oil on water surface," *2016 Techno-Ocean (Techno-Ocean)*, Kobe, 2016, pp. 354-359.

doi: 10.1109/Techno-Ocean.2016.7890678

Abstract: For protecting important port facilities such as emergency evacuation bases from oil spill incident triggered by natural disasters, some self-sufficient countermeasures are required for blocking or eliminating floating oil from the facilities. For this purpose, bubble curtain was studied. The bubble curtain itself already has some preceding researches or applications for containment of floating oil, most of all, however, deals with the phenomena in open sea. This paper especially focuses on the bubble curtain deployed near a vertical wall, intended for application to protecting land facilities. Experimental measurements using video processing were carried out in a test tank to see how large oil-free area the bubble curtain can generate. The experimental results were analyzed and arranged to a simple empirical equation providing the size of oil free area. 2-D and 3-D Numerical simulations using OpenFOAM was also conducted for verifying the experimental results and for deeper understanding of air-water multiphase physics. This paper also includes discussion about the horizontal velocity field that the bubble promotes near the water surface and comparison with some previous studies.

keywords: {condition monitoring;geotechnical engineering;geotechnical structures;marine pollution;oil pollution;sea ports;structural engineering computing;video signal processing;walls;water pollution control;OpenFOAM;air-water multiphase physics;bubble curtain;oil spill incidents;port facilities;spilled oil blocking;video processing;water surface;Atmospheric modeling;Feeds;Numerical models;Numerical simulation;Oils;Sea measurements;Sea surface;OpenFOAM;bubble curtain;oil spill;tracking;turbulent diffusivity},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7890678&isnumber=7890624>

T. Ikoma, K. Masuda, H. Eto, K. Kihara and S. Shibuya, "A model test of an OWC type WEC using wave dissipating double-caissons in a wave tank," *2016 Techno-Ocean (Techno-Ocean)*, Kobe, 2016, pp. 510-514.

doi: 10.1109/Techno-Ocean.2016.7890707

Abstract: Several types of oscillating water column (OWC) type wave energy converters (WECs) are researched and developed in the world. They are floating types and fixed types. In case of a fixed type, wave dissipating caissons could be replaced to WECs of an OWC type. On OWC types, installation of the projecting-walls (PWs) is useful in order to improve PTO performance. In this study, it was considered that a double dissipating caisson was used as an OWC type WEC with PWs. A front caisson of the double caisson seems the area surrounded by PWs and a back caisson can be seen as an OWC. The paper studied basic property of the primary conversion from wave power to power of air with model tests in a wave tank. As a result, wave height strongly effects on behaviors of OWC motion as well as air pressure. Finally, the primary conversion and PTO performance was affected by wave height. Besides, the concept of use of a double caisson was useful from PTO performance estimated.

keywords: {oscillations;wave power generation;OWC motion;OWC type WEC;oscillating water column;wave dissipating double-caissons;wave energy converters;wave tank;Atmospheric modeling;Discrete Fourier transforms;Ducts;Orifices;Pressure measurement;Turbines;Wave power;Oscillating water column;Projecting-wall;Wave energy converter;model experiment;wave dissipating caisson},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7890707&isnumber=7890624>

W. A. H. Randima, M. A. D. K. Wijethilaka, G. H. V. S. Kumara and P. I. A. Gomes, "Deflectors to introduce heterogeneity to canals," *2017 6th National Conference on Technology and Management (NCTM)*, Malabe, 2017, pp. 116-119.

doi: 10.1109/NCTM.2017.7872838

Abstract: Canals are manmade lotic water systems constructed for flood control, navigation, irrigation, etc. In general, canals are eco-hydrologically homogeneous. As such, a canal might have the same prismatic cross section and an even bed profile along its course. Such characteristics do not support rich biota, something a sustainable society expects. Several past studies have attributed heterogeneity to be an important factor for a healthy stream. In this study the deflectors were used to introduce the heterogeneity in canals. In tandem studying flow complexity by deflectors, their role with respect to sediment (sand) and seed transport, and fisheries were also studied. The model canal's (laboratory flume) homogenous velocity of 0.4 m/s changed to a range of values from 0.1 to 0.7 m/s after placing deflectors. Similarly, water depth changed from a uniform 30 mm to a range from 20 mm to 70 mm. This resulted in formation of flow patches similar to flow patches formed by meso-scale physical habitats such as pools and riffles. Sediment deposition was patchy and seemed to be stable as only a minor bedload movement was observed for prolonged durations. This meant it is possible to achieve a quasi-equilibrium state in field canals where upstream brings sediments. Seed trapping was weak for floating type seeds, whereas non-floating seeds managed to get deposited with sediment. Fishes quickly migrated to the pool like areas that resulted from deflectors. The

results suggested the role of deflectors in transforming a homogenous channel to heterogeneous channel that has the potential to have rich biota which is essential in ecological rehabilitation works.

keywords: {aquaculture;canals;hydrological techniques;sediments;canal;deflector;ecological rehabilitation work;fisheries;flow complexity;flow patch formation;heterogeneous channel;homogenous channel;manmade lotic water system;mesoscale physical habitat;quasiequilibrium state;sediment deposition;seed transport;Decision support systems;Canal;Deflector;Fish;Sediment;Seed;Velocity},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7872838&isnumber=7872810>

D. B. Agusdinata, "Evaluating water infrastructure and agriculture practices for drought adaptations in East Africa: A combined hydrological and system dynamics approach," *2016 IEEE Global Humanitarian Technology Conference (GHTC)*, Seattle, WA, 2016, pp. 753-760.

doi: 10.1109/GHTC.2016.7857362

Abstract: As drought occurrences have increased in frequency and intensity, cost-effective policies for drought adaptations are needed. The study focuses on evaluating the cost effectiveness of innovative agricultural practices and hydraulic infrastructure for the region of East Africa. A combined hydrological and system dynamics model has been developed to represent the relationships between water availability, livestock and crop production, and the socio-economic and policy aspects. The hydraulic infrastructure measures are meant to increase the overall water availability. Five different hydraulic infrastructure options were considered: sand dams, rooftop rain water harvesting tanks, ponds, shallow wells, and boreholes. The agricultural practices include drip irrigation and agroforestry that are aimed at increasing crop yields and diversifying income, thus improving population resiliency during drought period. Using the metric of cost per gained cubic meter of water and the net present value of investment, the study found that a combination of increased hydraulic infrastructure and innovative agricultural practice policy can reduce domestic water deficits by 54-100% while increasing the income per capita by up to 285% over a 10-year simulation period. It was also found that the policies have different cost-benefit distributions on various stakeholders including pastoralist, agro-pastoralists, and farmers.

keywords: {critical infrastructures;dams;government policies;hydrology;irrigation;water conservation;East Africa;agriculture practices;agroforestry;boreholes;cost-benefit distributions;crop production;drip irrigation;drought adaptations;hydraulic infrastructure;hydrology;policies;ponds;rooftop rain water harvesting tanks;sand dams;shallow wells;socio-economic aspects;water availability;water infrastructures;Africa;Agriculture;Production;Sociology;Statistics;System dynamics;Vegetation;agroforestry;cost-effective policies;drip irrigation;drought adaptations;hydraulic infrastructure;system dynamics and hydrological modeling},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7857362&isnumber=7857239>

B. Haghighat and A. Martinoli, "Characterization and validation of a novel robotic system for fluid-mediated programmable stochastic self-assembly," *2016 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Daejeon, 2016, pp. 2778-2783.

doi: 10.1109/IROS.2016.7759431

Abstract: Several self-assembly systems have been developed in recent years, where depending on the capabilities of the building blocks and the controllability of the environment, the assembly process is guided typically through either a fully centralized or a fully distributed control approach. In this work, we present a novel experimental system for studying the range of fully centralized to fully distributed control strategies. The system is built around the floating 3-cm-sized Lily robots, and comprises a water-filled tank with peripheral pumps, an overhead camera, an overhead projector, and a workstation capable of controlling the fluidic flow field, setting the ambient luminosity, communicating with the robots over radio, and visually tracking their trajectories. We carry out several experiments to characterize the system and validate its capabilities. First, a statistical analysis is conducted to show that the system is governed by reaction diffusion dynamics, and validate the applicability of the standard chemical kinetics modeling. Additionally, the natural tendency of the system for structure formation subject to different flow fields is investigated and corresponding implications on guiding the self-assembly process are discussed. Finally, two control approaches are studied: 1) a fully distributed control approach and 2) a distributed approach with additional central supervision exhibiting an improved performance. The formation time statistics are compared and a discussion on the generalization of the method is provided.

keywords: {distributed control;flow control;reaction kinetics;reaction-diffusion systems;self-assembly;statistical analysis;stochastic systems;trajectory control;ambient luminosity;central supervision;chemical kinetics modeling;floating 3-cm-sized Lily robots;fluid-mediated programmable stochastic self-assembly;fluidic flow field control;formation time statistics;fully centralized control;fully distributed control;novel robotic system;radio communication;reaction diffusion dynamics;self-assembly systems;statistical analysis;structure formation subject;trajectory tracking;Decentralized control;Process control;Robot sensing systems;Stochastic processes;Trajectory;Wireless communication},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7759431&isnumber=7758082>

J. F. Flory *et al.*, "Mooring systems for marine energy converters," *OCEANS 2016 MTS/IEEE Monterey*, Monterey, CA, 2016, pp. 1-13.

doi: 10.1109/OCEANS.2016.7761007

Abstract: This paper discusses several new technologies for mooring floating marine energy converter (MEC) devices, such as wave energy generators, tidal current turbines and floating wind turbines. The principal mooring component is a special nylon fiber rope which provides cyclic tension fatigue endurance much superior to that of conventional nylon ropes. The nylon fiber is treated with a new proprietary coating which has excellent wet yarn abrasion properties. The parallel-subrope type rope construction further reduces internal abrasion. Extensive laboratory testing was carried out on this new nylon rope design. Cyclic tension fatigue tests were conducted at mean loads and load amplitudes typical of actual service conditions and at higher mean loads and amplitudes. These tests demonstrate that the special nylon rope has essentially the same, desirable stretch characteristics as conventional nylon rope and has much better endurance performance. The mooring connection to the floating MEC device consists of a high-modulus fiber rope pendant which passes through a low-friction bell-mouth nylon fairlead on the MEC device. This eliminates the use of heavy, unreliable chain in this critical connection. A unique bag anchor system would be used on sand, clay, rock and other sea beds in which conventional drag embedment anchors and driven piles are impractical. The bag anchor consists of a large abrasion resistant carcass with lifting straps and top closure. The bag is transported to site in a collapsed form and is filled with local sand or aggregate to provide ballast weight. Several or many such bags are enclosed within a fiber rope net for deployment and are grouped together for connection to the mooring line. The paper will be of particular interest to designers of moorings for MEC systems in shallow water and severe wave environments. It will also be of interest for other mooring applications.

keywords: {abrasion;anchors;coatings;fatigue testing;marine power systems;polymer fibres;ropes;tidal power stations;wave power generation;wind turbines;yarn;MEC device;bag anchor system;ballast weight;clay;coating;cyclic tension fatigue testing;drag embedment

anchor;driven pile;floating wind turbine;high-modulus fiber rope pendant;low-friction bell-mouth nylon;mooring floating marine energy converter;nylon fiber rope design;parallel-subrope type rope construction;rock;sand;sea bed;tidal current turbine;wave energy generator;wet yarn abrasion property;Fatigue;Legged locomotion;Optical fiber cables;Optical fiber devices;Synthetic fibers;Testing;Yarn;anchor;buoy;current energy;energy converter;fairlead;mooring;nylon;rope;test;wave energy;wind energy},
URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7761007&isnumber=7760990>

K. R. Kumar and S. P. Kulgod, "Simulation and analysis of energy harvesting from Grey water and rain water in high rises," *2016 International Conference on Energy Efficient Technologies for Sustainability (ICEETS)*, Nagercoil, 2016, pp. 856-861.
doi: 10.1109/ICEETS.2016.7583866

Abstract: Majority of the population is dependent on the conventional energy sources for their day today needs. Leading edge research on the renewable sources of energy is on a rise in order to meet the increasing energy demand without straining the environment. The objective of this project is to harvest potential energy inherent in tall buildings because of the high altitudes using micro-pelton turbine at the ground from grey water and rain water. Purified Grey water is collected in a tank placed at the centre of the building and rain water collection tank is placed at the top of the building. A control system is designed for optimum power output from the turbine and to monitor the levels of water. Separation and storage of used rainwater in a tank is also controlled. The pelton turbine is designed and further analyzed in ANSYS - Fluent, computationally for the power output. When number of high rises is escalating and awareness about rainwater harvesting and renewable sources of energy is indispensable, this source of energy will turn out to be viable option.

keywords: {energy harvesting;hydraulic turbines;tanks (containers);ANSYS-Fluent;control system;energy harvesting;energy sources;grey water;micropelton turbine;pelton turbine;purified grey water;rain water;rain water collection tank;rainwater;rainwater harvesting;renewable sources;Buildings;Control systems;Rain;Valves;Wind turbines;Hydroelectric energy;Renewable energy;Tall buildings;computational fluid dynamics;control systems},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7583866&isnumber=7582888>

K. R. Kumar, S. P. Kulgod and A. Surendran, "Simulation and analysis of energy harvesting from grey water and rain water in high rises," *2016 IEEE Region 10 Symposium (TENSYP)*, Bali, 2016, pp. 404-409.

doi: 10.1109/TENCONSpring.2016.7519441

Abstract: Leading edge research on the renewable sources of energy is on a rise in order to meet the increasing energy demand. The objective of this project is to harvest potential energy inherent in tall buildings using micro-pelton turbine at the ground from grey water and rain water. Purified water is collected in separate tanks and a control system is designed for optimum power output from the micro-turbine which is analyzed computationally. With the escalating number of high rises and increasing awareness about renewable sources of energy, this source of energy can become a viable alternative.

keywords: {buildings (structures);energy harvesting;renewable energy sources;water resources;energy demand;energy harvesting analysis;energy harvesting simulation;grey water;high rise buildings;micro-pelton turbine;potential energy harvesting;purified water;rain water;renewable energy source;Buildings;Control systems;Mathematical model;Rain;Turbines;Valves;Hydroelectric energy;Renewable energy;Tall buildings;computational fluid dynamics;control systems},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7519441&isnumber=7519362>

M. J. Doyle, Xinyu Xu, Yue Gu, F. Perez-Diaz, C. Parrott and R. Groß, "Modular Hydraulic Propulsion: A robot that moves by routing fluid through itself," *2016 IEEE International Conference on Robotics and Automation (ICRA)*, Stockholm, 2016, pp. 5189-5196.
doi: 10.1109/ICRA.2016.7487725

Abstract: This paper introduces the concept of Modular Hydraulic Propulsion, in which a modular robot that operates in a fluid environment moves by routing the fluid through itself. The robot's modules represent sections of a hydraulics network. Each module can move fluid between any of its faces. The modules (network sections) can be rearranged into arbitrary topologies. We propose a decentralized motion controller, which does not require modules to communicate, compute, nor store information during run-time. We use 3-D simulations to compare the performance of this controller to that of a centralized controller with full knowledge of the task. We also detail the design and fabrication of six 2-D prototype modules, which float in a water tank. Results of systematic experiments show that the decentralized controller, despite its simplicity, reliably steers modular robots towards a light source. Modular Hydraulic Propulsion could offer new solutions to problems requiring reconfigurable systems to move precisely in 3-D, such as inspection of pipes, vascular systems or other confined spaces.

keywords: {decentralised control;flow control;hydraulic control equipment;marine control;marine propulsion;mobile robots;motion control;2D prototype modules;3D simulations;decentralized motion controller;fluid environment;fluid routing;hydraulics network;modular hydraulic propulsion;modular robot;robot modules;water tank;Force;Light sources;Propulsion;Robot kinematics;Robot sensing systems;Routing},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7487725&isnumber=7487087>

B. C. Xavier, C. P. Ribeiro, L. G. Guimarães, M. G. Gallo and A. G. Figueiredo, "Estimation of suspended sediment concentration by acoustic calibration and scattering properties: An experimental and theoretical analysis," *2015 IEEE/OES Acoustics in Underwater Geosciences Symposium (RIO Acoustics)*, Rio de Janeiro, 2015, pp. 1-7.

doi: 10.1109/RIOAcoustics.2015.7473638

Abstract: Sedimentation is a primary and growing environmental, engineering, and agricultural issue around the world. As the needed data collection to develop solutions to sedimentation issues has declined, acoustic suspended sediment have been used to potentially obtain sediment data more accurately, with higher spatial and temporal resolution, and with less intensive, costly, toilful and dangerous methods. However, the extraction of suspended sediment parameters from acoustic data requires an understanding of the interaction of the sound with a sediment suspension and an inversion methodology. This inversion requires a description of the intrinsic particles scattering properties, which are usually quantified in terms of the normalized total scattering cross section and the backscatter form function, both expressing the attenuation and backscatter of the acoustic signals, respectively. This work presents a laboratory study to examine the relationship between suspended sediment concentrations (SSC) of glass microspheres, and the backscattered signals recorded by a 6MHz Acoustic Doppler Velocimeter (ADV - Nortek Vector). A mixture of glass microspheres and very fine alumina particles was also used to verify the influence of viscous attenuation in the backscattering signals, which somehow is a controversial aspect in the literature. Backscattering predictions were obtained using an inversion model based on adaptations of Beer's law considering the intrinsic particle scattering properties and the velocimeter sampling volume characteristics. Originally, this law was developed to measure the light transmission by a collection of particles. The main goal of this topic was to verify the applicability of this

model to calibrate the acoustical device using only a sample of water or superficial bottom sediments. Measurements were taken using a simple experimental apparatus: the ADV was immersed in a 50 liter acrylic tank in which known concentrations of glass microspheres with medium- diameters $<D>$ of 41, 75 and 218 μ m were mixed by a stirrer and a pump in distilled water to obtain a homogeneous solution. The bimodal size distribution, with one narrow peak in the size range of clay and the other in the size range of fine sand, was used to exploit the acoustic scattering and dissipation properties of the water-sediment mixture. Following the sedimentologists' common practice, for concentrations less than 1500mg/l, a region of linearity between the logarithm of concentration and time-average relative acoustic backscatter (RB) was found. The experimental data was used to develop calibrated equations of the form $\log(SSC)=c_1*RB+c_2$; R^2 values for all calibrated equations were greater than 0.98, suggesting that properly calibrated relations can yield accurate time-averaged SSC measurements using Vector measured and attenuation corrected RB. With the results obtained, it is concluded that the proposed Beer inversion model can be used reasonably to estimate suspended sediments in concentrations where the attenuation does not affect the acoustic backscatter, and once a consideration have been taken on the incident acoustic intensity. The application of Hanes's formula to a velocimeter rather than a profiler does not provide good results. Lastly, the relative backscattering was found to be proportional to the logarithm of concentration, indicating that the velocimeter is a useful tool for measuring suspended sediment concentration.

keywords: {Doppler measurement;geophysical techniques;sand;sediments;velocimeters;Beer inversion model;Beer law;Hanes formula;acoustic Doppler velocimeter;acoustic calibration;acoustic data;acoustic scattering;acoustic signal attenuation;acoustic signal backscatter;acoustic suspended sediment;acoustical device;acrylic tank;backscatter form function;backscattering prediction;bimodal size distribution;distilled water;fine sand;glass microsphere;incident acoustic intensity;intrinsic particles scattering property;light transmission;particle scattering property;relative backscattering;sediment data;sediment suspension;sedimentation;sound interaction;spatiotemporal resolution;superficial bottom sediment;suspended sediment concentration estimation;suspended sediment parameters;time-average relative acoustic backscatter;time-averaged SSC measurements;total scattering crosssection;velocimeter sampling volume characteristics;very fine alumina particle;viscous attenuation;water-sediment mixture;Acoustic measurements;Acoustics;Atmospheric measurements;Attenuation;Backscatter;Scattering;Sediments;Acoustic Doppler velocimeter;Acoustic backscattering;Form function;Glass microspheres;Normalized total scattering cross section;Suspended sediment concentration},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7473638&isnumber=7473581>

P. C. Binh, N. M. Tri, D. T. Dung, K. K. Ahn, S. J. Kim and W. Koo, "Analysis, design and experiment investigation of a novel wave energy converter," in *IET Generation, Transmission & Distribution*, vol. 10, no. 2, pp. 460-469, 2 4 2016.

doi: 10.1049/iet-gtd.2015.0821

Abstract: This study presents an innovative design for a wave energy converter (WEC). The system is based on a novel mechanical power take-off (PTO) device that can absorb wave energy by converting the bidirectional motion of an ocean wave into the one-way rotation of an electric generator. First, the PTO mechanism and configuration are described in detail. A coupled mechanical and hydrodynamic time-domain simulation of a hemispherical floating buoy connected to a bidirectional gearbox and torque generation device under regular waves were modelled in MATLAB®/Simulink®. The hydrodynamic forces acting on the semi-submerged floating buoy are calculated by employing linear potential wave theory. The friction behaviour in the PTO system is modelled by using Brian Armstrong's method. Next, an average wave energy and absorbed energy calculation was applied to investigate the conversion efficiency of the WEC. Finally, the experimental setup is carried out in a water tank under various conditions to evaluate the performance of WEC and validate the modelling. The results indicate that high-energy conversion efficiency of generating electricity from waves is approachable, thanks to the high efficiency of the proposed device.

keywords: {direct energy conversion;hydrodynamics;time-domain analysis;wave power generation;PTO device;WEC;absorbed energy calculation;bidirectional gearbox;electric generator;hemispherical floating buoy;hydrodynamic time-domain simulation;linear potential wave theory;mechanical power take-off;ocean wave;one-way rotation;semisubmerged floating buoy;torque generation device;wave energy converter},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7407704&isnumber=7407694>

L. K. Rumbaugh, D. W. Illig, M. K. Banavar, W. D. Jemison and B. Cochenour, "A wideband noise-like transmitter approach for underwater lidar using diode lasers and passive fiber optic processors," *OCEANS 2015 - MTS/IEEE Washington*, Washington, DC, 2015, pp. 1-8.

doi: 10.23919/OCEANS.2015.7401901

Abstract: A new wideband noise-like transmitter approach is presented for high resolution underwater lidar sensing. The transmitter approach is based on small-footprint, low-cost components, using low coherence time laser diodes and passive fiber processors to generate wideband noise-like intensity modulation signals in the blue-green optical spectrum. Prototype transmitters are demonstrated using both blue and green laser diodes with passive fiber interferometer structures. Laboratory water tank experiments using a two-diode 516/518 nm prototype transmitter show centimeter range error and 30 cm range resolution while detecting a submerged gray target in up to ten attenuation lengths of turbid water. Experimentally observed challenges for target rangefinding are discussed, including shot noise, backscatter returns, and self-clutter. Strategies are proposed to mitigate these challenges and enhance performance when operating at long standoff distances in turbid waters.

keywords: {image resolution;intensity modulation;optical radar;passive optical networks;semiconductor lasers;underwater optical wireless communication;backscatter returns;blue-green optical spectrum;high resolution underwater lidar sensing;low coherence time laser diodes;passive fiber interferometer structures;passive fiber optic processors;passive fiber processors;self-clutter;shot noise;submerged gray target;target detection;target rangefinding;turbid waters;wideband noise-like intensity modulation signals;wideband noise-like transmitter approach;Intensity modulation;Laser radar;Optical transmitters;Prototypes;Semiconductor lasers;Sensors;Wideband},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7401901&isnumber=7401802>