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A multivariable nonlinear MPC control strategy for thermal comfort and indoor-air quality

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[Maria del Mar Castilla](#) ; [Jose D. Alvarez](#) ; [Julio E. Normey-Rico](#) ; [Francisco Rodriguez](#) ; [Manuel Berenguel](#)[View All Authors](#)**Abstract**[Authors](#)[Figures](#)[References](#)[Citations](#)[Keywords](#)[Metrics](#)[Media](#)

Abstract:

Comfort conditions inside buildings are a problem that is being widely analyzed, since it has a direct effect on users' productivity, and an indirect effect on energy saving. Hence, in order to maintain thermal comfort and indoor-air quality inside a certain environment, it is required to perform a proper management of its active and passive components, as the HVAC (Heating, Ventilation and Air Conditioning) systems, and natural ventilation through windows. This paper presents a multivariable nonlinear model predictive control system to simultaneously maintain thermal comfort and indoor-air quality by means of forced and natural ventilation. In order to probe the effectiveness of the proposed control approach, simulation results obtained in a characteristic room of a bioclimatic building are included and widely commented.

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Keywords

IEEE Keywords

Indexes, Buildings, Ventilation, Meteorology, Atmospheric modeling, Heat transfer

INSPEC: Controlled Indexing

predictive control, air quality, building management systems, buildings (structures), HVAC, multivariable control systems, nonlinear control systems

INSPEC: Non-Controlled Indexing

bioclimatic building, multivariable nonlinear MPC control strategy, thermal comfort, indoor-air quality, comfort conditions, buildings, user productivity, energy saving, active component, passive component, HVAC, heating ventilation and air conditioning systems, natural ventilation, multivariable nonlinear model predictive control system, forced ventilation

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