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A numerical method predicting paper velocity at the roller transfer unit in an electrophotographic system

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Abstract:

A numerical method that predicts the paper velocity at the roller transfer unit in an electrophotographic system is presented including the roller slip characteristics and the tension in the paper. The roller slip characteristics are derived from the measurement of the relative velocity between the roller and a paper under an external force. The paper feeding simulation is used to calculate the tension in the paper among the registration rollers, the roller transfer unit and the fuser rollers. The paper velocity at the roller transfer unit is predicted solving the equilibrium equations between the traction given by the transfer roller and the photoreceptor drum and the tension in the paper. The predicted velocities agree well with those from experiments, which is based on the time interval sensing of the pattern of lines printed on papers.

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Contents

1. Introduction

The manufacturing of papers consumes a lot of energy and generates a significant amount of CO₂^[1]. Therefore, a more efficient use of paper without the degradation of image quality is one of main issues in designing electrophotographic machines and is also one of our goals in terms of a reduction of the environmental impact. The robustness against paper jamming which occurs when using recycled papers, the improvement of duplex copying productivity for saving papers and the precise control of paper feeding for higher image quality in order to provide high quality prints to customers require a sophisticated paper feeding technology. We have developed a paper handling simulator for the first and the second demands, which is now used to improve designs of machines^[2]. The third contains an unsolved frictional and tribological problem which has inhibited the precise prediction of the paper velocity during the image transfer.

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