

# Analytical and Numerical Modelling of Paper Dynamics in Paper Making Process

Tytti Saksa

## Abstract

The behaviour of systems, in which some material travels axially at fast speed between two supports, has been extensively studied for over half a century. Interest in these studies arises from the extensive amount of applications in industry, e. g. in paper making processes. Some materials, e. g. wet paper, have viscoelastic properties. In this study, we investigate the transverse displacement of a viscoelastic panel travelling between and in contact with two supports. Using a linear Kirchhoff plate model and a Kelvin-Voigt viscoelasticity model, a partial differential equation for the transverse displacement of the plate is presented. The contact with the supporting rollers is modelled by a nonlinear spring force between the roller and the panel. One dimensional simulation of the behaviour of the panel is carried out using simply supported boundary conditions at the edges. A comparison of the behaviour between the model including the contact effect and the classic model with no contact is made.