Sensitivity analysis of Newtonian and Non-newtonian fluids in slot coating process

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The sensitivity of slot coating process, one of techniques for optimizing process against unexpected disturbances, has been analyzed by using frequency response. Since even the stable system is encountered with a small disturbance that affects the non-uniformity of the coating layer, elucidating the response to disturbances under different operating conditions is very important. Frequency response method measures the amplitude of coating thickness variations with respect to the sinusoidal ongoing perturbations at flow rate, web speed, bead pressure, etc. Theoretically, the response of coating flow has been estimated for Newtonian and non-Newtonian fluids using one-dimensional and two-dimensional models (Flow-3D). Also, the sinusoidal changes of wet film thickness with web speed have been measured and compared with those by theory at low frequency condition.