An experimental study in flow instabilities of roll coating process

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Coating process is characterized by solidifying or annealing coating liquids on the web via drying or curing step after applying them by various coaters. Among many coating processes (e.g., roll; slot; curtain coatings, etc.), roll coating process is featured by the use of one or more gaps between rotating rolls to meter and apply the coating liquid to web or substrate. Roll coating process can be mainly divided into forward and reverse mode by the rotating direction of the rolls. Flow dynamics in roll coating processes has been focused in this study to scrutinize the relationship between the coating windows and liquid property. Newtonian and the viscoelastic solutions have been selected as coating liquids. The wavelength and severity of ribbing instability, which exhibits periodic thickness variance in cross-web direction, has been experimentally compared by changing gap-to-radius ratio, capillary number, speed ratio, etc.