

## Flow Visualisation of a Multilayer Slide Coating Flow

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**Abstract** Coating or the deposition of a thin film onto a solid surface is an important processing applications find in many industries, paper, adhesives, photographic films, printed circuits, photovoltaic cells, batteries and many others [1]. In the new technological applications, the film is required in a multilayer form with 4 or 5 layers being coated simultaneously using slide or slot coating [2]. In such coating operation, the films are delivered from a multilayer die and deposited directly onto a moving web, a plastic sheet. Typically the films which are deposited in a liquid state first before being dried or cured, will have thickness of order 5-100 micrometers. For economic reasons, it is desirable that the operation is carried at speed, of order typically 1m/s. Clearly, such multilayer fluid flow will be prone to surface and interphase instabilities (in the form of waves for example) which if not controlled will render the final product unsuitable for its application (optical performance for example). The aim of the research presented in this paper is to study such instabilities using flow visualisation of the multi-layers as they flow down an incline of a slide die then onto a moving web. In the presentation, we will introduce the problem, review prior work in the field and describe the purpose made die with its glass viewing windows, the flow visualisation technique used and the results of the observation of instabilities that may arise along the slide and carried through on the substrate. The onset of instabilities will depend on the thickness of the films, their speeds and physical properties, viscosity and surface tension in particular. We will conclude our presentation by proposing a coating window or the operating conditions that demarcate stable operation..

**Keywords:** Fluid Mechanics; Multilayer Flow; Flow Instabilities

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### References

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