

### 1D model of viscoplastic flow inside manifold

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Slot coating is considered one of the promising coating methods for continuous manufacturing of various thin film products. As thin films are required to be multifunctional, coating liquid become more complex, i.e. Visco-plasticity is one of such liquid, especially for dense suspension: the liquid does not flow under a certain threshold stress, so called yield stress.

In processing highly uniform film, slot coating die manifold needs to be carefully designed such that the flow rate per unit width across the feed slot to match uniformity requirement.. In such designing phase, a simple one-dimensional model can be useful to narrow down design candidates and quick estimations of performance.

Numerous simple manifold model for Newtonian and power-law fluids are proposed so far (Steven J. Weinstein and Kenneth J. Ruschak 1996). Yet, as far as we know, no one-dimensional model for visco-plastic flow is proposed. By considering visco-plasticity, we will propose a simple one-dimensional model for the manifold flow, and verify the model by computational fluid dynamic software, Fluent.