1161-35-150　　　　　**Thomas Hagen*** (`thagen@memphis.edu`), The University of Memphis, Deaprtment of Mathematical Sciences, Memphis, TN 38152. *Linearized free liquid films: Semigroup regularity from asymptotics.*

Free liquid films are formed during common plastics engineering processes, including cast film extrusion. A polymeric melt is fed through a die, stretched downward into a fluid sheet and solidified. For a highly viscous, thin material the mathematical model of this free liquid film was first given in the pioneering work of Yeow and Pearson in the 1970s. This model takes the form of a transport equation coupled to an elliptic system of momentum equations in two-dimensional space. The governing equations simplify to the one-dimensional "infinite width" model if dependence on the lateral direction is omitted.

In this presentation I will report about recent results for the linearization about steady state of the full two-dimensional model under the assumption of lateral periodicity. Specifically, I will show that the linearized equations satisfy the semigroup property and that the semigroup, being non-analytic, has distinct smoothing properties. This latter result is based on high-frequency asymptotic estimates for the momentum equations. These estimates prove that the semigroup is generated by a linear transport operator, perturbed by a compact operator which - surprisingly and in contrast to the one-dimensional case - is not Hilbert-Schmidt. (Received August 15, 2020)