

Seminar of the Work Group  
Nonlinear Partial Differential Equations  
SS 22

**Speaker: JProf. Christina Lienstromberg**  
**May 17th, 2022, 14:00 - 15:00**  
**Seminar room: 3.061**

## LONG-TIME BEHAVIOUR OF SOLUTIONS TO NON-NEWTONIAN THIN-FILM EQUATIONS

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### ABSTRACT

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I will offer an insight into mathematical models describing the dynamic behaviour of non-Newtonian thin-film flows in different geometries. The resulting PDEs are in general nonlinear, degenerate, of fourth order, and with a possibly 'weak' dependence of the coefficients on the unknown.

We discuss recent results on the long-time behaviour of solutions to an evolution equation for the surface of a non-Newtonian fluid film with power-law rheology. In the case of shear-thickening fluids, one observes that solutions which are initially close to a steady state, converge to equilibrium in finite time. In the shear-thinning case, we find that steady states are polynomially stable in the sense that, as time tends to infinity, solutions which are initially close to a steady state, converge to equilibrium at rate  $1/t^{1/\beta}$  for some  $\beta > 0$ .

This is joint work with Jonas Jansen, Tania Pernas-Castaño, Juan Velázquez (all Bonn) and Katerina Nik (Vienna).