Asymptotic decay and rupture in thin viscous liquid sheets: past and new

Kitavtsev, Georgy; University of Bristol

We start with a revision of previously known facts on mechanisms for rupture or its prevention in viscous liquid sheets. As a manifestation of a well accepted fact that, in contrast to axisymmetric viscous jets, liquid sheets do not rupture without additional physics taken into account we show rigorously asymptotic decay of them to constant flat profiles in the long time regime. Moreover, if sheet viscosity is small the recovery path to the flat profile exibites an interesting dynamical self-similar behaviour. In the second part of the talk we show a quantitative estimate for the sheet rupture time under presence of van der Waals forces as well as a new type of self-similar solution for thermally driven sheet rupture. These results originate from joint work with Jens Eggers and Roman Taranets.