Stability of thin film flows

Abstract: We consider the flow problem which occurs during the coating
of fluoresecent light tubes. Experimentally, it has been established
that the flow is often unstable. We develop a lubrication theory model
to examine the stability from a theoretical point of view. We present
new closed form solutions for the steady state coating thickness and
using these solutions we perform a linear stability analysis. In the
zero order lubrication theory, the flow is shown to be always neutrally
stable. We hypothesize that the observed instabilities are caused by
higher order effects and develop a sharper version of the lubrication
model.

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