
CHUNHUA OU, Memorial University

Periodic steady-state solutions to the liquid film flowing model: existence and stability

In this talk, we investigate the dynamics of a liquid film flowing over a periodic wavy wall. This study is based on a long-wave model that is valid at near-critical Reynolds number. For the periodic wall surface, we construct an iteration scheme in terms of an integral form of the original steady-state problem. The uniform convergence of the scheme is proved so that we can derive the existence, uniqueness as well as the asymptotic formula of the periodic solutions. These results can also be obtained by the method of abstract contraction mapping in a particular functional space. Using the Floquet-Bloch theory, we establish several analytic results on the stability/instability of the periodic steady-state solutions in a weighted functional space.