

Integral modelling of thin liquid films

Gianluca Lavalle, University of Edinburgh

Abstract:

Thin liquid films are encountered in numerous engineering applications, such as the aerospace and the chemical industry. Under the action of gravity and/or gas shearing, liquid films show interfacial waves, possibly much higher and longer than the film thickness. The presence of waves turns to be very important because greatly modifies momentum, heat and mass transfers. Nevertheless, since the film is much thinner than those waves, its dynamics can be modelled through an integral approach in order to save computational cost with respect to the classical DNS (Direct Numerical Simulation).

This talk will review the integral modelling of liquid films and present an original mathematical and numerical coupling to investigate the two-phase flow dynamics in narrow and large channels. Attention will be paid to the flooding phenomenon, i.e. when the waves are driven by the gas flow against the gravity, which is an unfortunate condition for technological devices.