Three-dimensional numerical simulations of falling liquid films[1]
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NAS, OMAR MATAR, Imperial College London — Falling liquid films down an
inclined or vertical surface have rich wave dynamics, often occurring in many indus-
trial applications, such as condensers, evaporators and chemical reactors. There are
some numerical studies for falling liquid films, however most of them have focused on
two-dimensional falling films or three-dimensional falling films in a periodic domain.
The objective of this study is to investigate flow dynamics of fully developed three-
dimensional falling films using the Navier-Stokes equations coupled with interface
capturing approach. An adaptive unstructured mesh modelling framework is em-
ployed here to study this problem, which can modify and adapt unstructured meshes
to better represent the underlying physics of multiphase problems and reduce compu-
tational effort without sacrificing accuracy. Numerical examples of two-dimensional
and three-dimensional falling films in a long domain with different flow conditions
are presented and discussed.

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