

# Models for Interfaces



Component  
École Nationale  
Supérieure  
d'Électrotechnique  
d'Électronique

## In brief

- > **Ametys Code:** N9EM01A
- > **Open to exchange students:** No

## Presentation

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### Objectives

Numerical simulation of flows at a deformable interface (with a solid or other liquid) is relevant to a wide range of applications, including the environment, geophysics, engineering and fundamental physics. This course presents numerical methods for solving the Navier-Stokes equations at deformable interfaces. Specific problems are induced by this type of geometry: position and deformation of the interface (generally in motion), modification of the topology (rupture-coalescence) and consideration of the discontinuity of physical quantities across the interface (density, viscosity, pressure, etc.).

### Description

The methods presented can be divided into two groups, depending on the type of mesh used to solve such problems. For evolutionary mesh methods (Lagrangian methods), the interface is a boundary between two subdomains. Two main methods are presented: integral boundary methods (Stokes flow or potentials) and direct methods where the Navier-Stokes equations are solved in each phase in curvilinear coordinates and the mesh is adaptive. For fixed-mesh methods (Eulerian methods), the interface moves on a fixed grid. Different methods for tracking the interface are presented: marker methods, Level set or Volume of Fluid (VOF) using either a front capture or front tracking method.