Three-Dimensional Fragmentation of Core-Annular Flow

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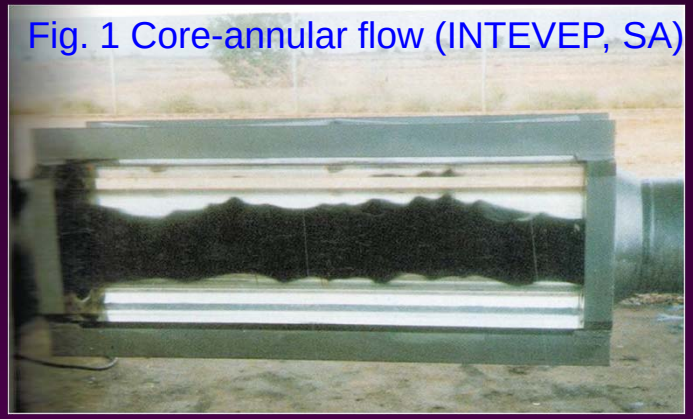
Fig. 1 Core-annular flow (INTEVEP, SA)



Objective: in this project we aim to develop an accurate and efficient 3D computational approach to model the break-up and coalescence of interfaces encountered in two-phase flows. The approach has the capability of handling complex/moving solid boundaries and is been applied in the core-annular flow (CAF) to study the interfacial fragmentation.

To do this, we combined two types of immersed-boundary (IB) method, one for the fluid-fluid interface using a "diffuse" representation of the surface, and one for the fluid-solid interface using a "sharp" representation. Only a fixed Cartesian grid is needed in this method. The solid-boundary treatment allows for accurate representation of the wall effect.

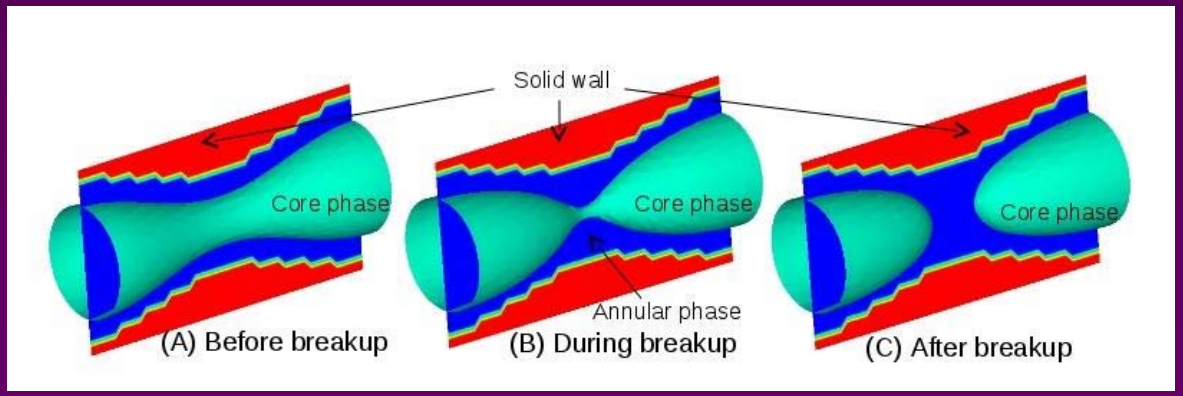


Fig. 2 Break-up of the core fluid of the CAF in a wavy channel, where the topological change of the interface due to break-up is captured by the level-set function.

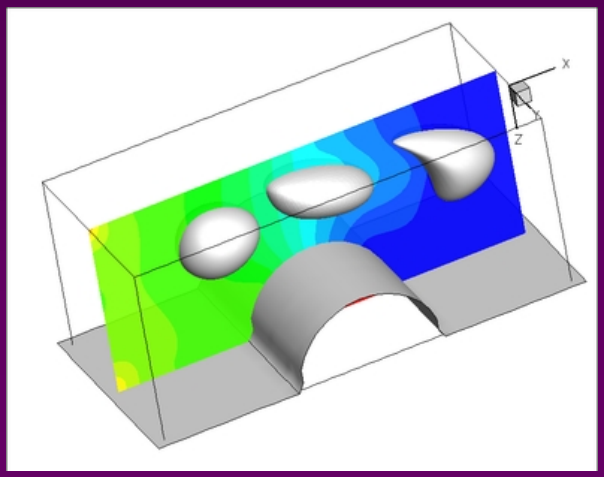


Fig. 3 A 3D demo showing drops going through an irregular channel.