SLUG FLOW VISUALIZATION IN NON-NEWTONIAN FLUIDS USING SIMULTANEOUS PIV AND SHADOWING TECHNIQUE

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Slug flows are two-phase flows characterized by long bubbles rising and almost filling a pipe cross section. In industry, slugs may appear in nearly any application employing two-phase flows in pipes, e.g. production of hydrocarbons in wells and their transportation in pipe lines or boiling and condensation in liquid-vapor systems of thermal power plants and also in tubular reactors. The bubble motion behavior in non-Newtonian fluids is of key importance in such diverse fluids as bubble columns, fermentation, polymer devolatilization and airlift reactors. The complex viscosity of the continuous phase results in a completely different flow behavior from that in classical Newtonian fluids, which results in a necessity of extending the slug flow research towards non-Newtonian fluids.

A new simultaneous PIV and shadowing technique was implemented in order to solve optical problems found in previous studies.

The velocity field around a single slug was obtained which is essential to understand the slugs' coalescence phenomena in future studies. In figure 1 it's represented the velocity field in 3 different zones of the slug: nose, falling film and wake.

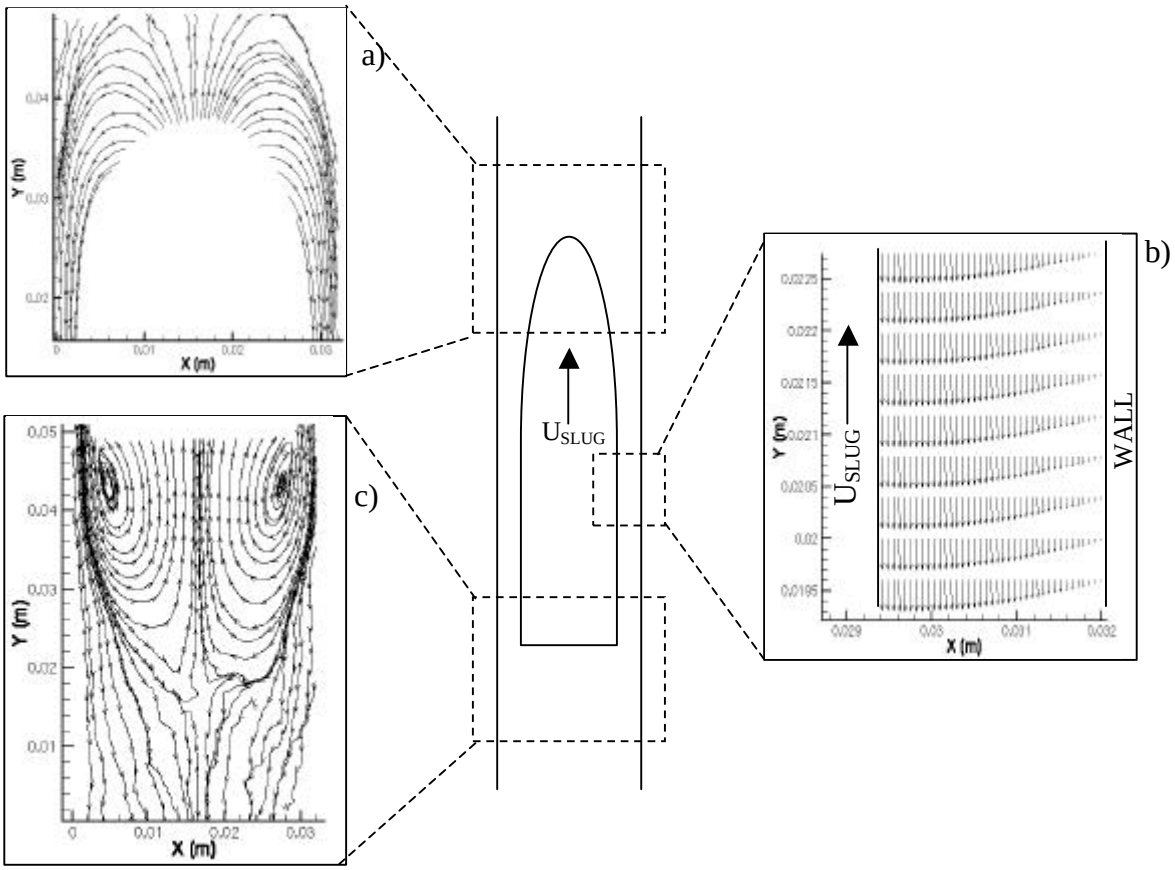

Figure 1: *Example of vlocity field around a gas slug: nose (a), falling film (b) and wake (c)*