PhD position in Physics

Droplet breakup analysis

Many industrial processes are concerned by atomization, particularly in transport industry. Multi-scale by nature, this process generates liquid structures of diverse shapes and sizes ranging from micrometers to centimeters. Atomization is often divided into primary atomization, near the injector, and secondary atomization, far from the injector. During the latter stage, turbulence plays an important role in breaking up the drops and creating smaller drops. Predicting the temporal evolution of drop sizes during secondary atomization is essential to control these processes.

The aim of this PhD is to systematically study the evolution and rupture of drops evolving in a turbulent gaseous medium using direct numerical simulation.

For this purpose, a simulation database will be created using the in-house direct numerical simulation code ARCHER. It will contain the temporal evolution of thousands of drops. This will allow the analysis of the evolution of the drops up to their breakup. The analysis of this database will thus allow us to refine our understanding of secondary breakup. We will focus on the coupling between the interface, the surrounding turbulence and the internal flow of the drop in order to improve secondary breakup models. The evolution of the drop surface will be analyzed using stability theory. The multi-scale approach will also be exploited in the drop analysis.

The applicant should hold a Master's Degree in General Physics with a solid knowledge of fluid mechanics. In particular in two-phase flows. Strong experience in CFD is mandatory and a taste for programming is welcomed.

Funding:	ANR project DropBreak
Laboratory:	CORIA, UMR 6614, Saint Etienne du Rouvray, France
Desired starting date:	As soon as possible (Spring 2021).
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