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Mixing of a Buoyant Jet in a Crossflow with the Lattice Boltzmann Method

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The Lattice Boltzmann Method (LBM) is a numerical approach for the study of fluid flows. It is based on a discretized version of the Boltzmann equation, and employs a mesoscopic approach where macroscopic flow quantities such as flow density and velocity are recovered as zero-th and first order moments of probability density functions. This method is, at its core, very simple, versatile and highly parallelizable; because of this, during the last few decades it has been used to investigate fluid flows in an increasing number of different fields of research. The aim of this talk is to describe how the LBM can be used to study mixing phenomena, as they are very common and play a fundamental role in a great number of processes. The dilution and diffusion of contaminants with negatively buoyant jets in a crossflow (JICF), in particular, is investigated carrying out large eddy simulations in a LBM framework, and it is shown how this method is able to capture some of the fundamental characteristics of JICF.

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