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Experiments on coastal dispersion in a two-dimensional turbulent flow LUIS ZAVALA SANSON, CICESE — Lagrangian dispersion in a turbulent, two-dimensional flow is analyzed by means of laboratory experiments. The results are oriented to understand the dispersion properties depending on the characteristics of the turbulence. The initial turbulent field is produced by forcing a number of vortices electromagnetically in a thin, conductive fluid layer in a square container. Below the tank, an array of 10 X 10 magnets is placed with their main magnetic field component directed up and downwards, alternatively. The fluid is set in motion by Lorentz forces when introducing an electrical current in the horizontal plane. This method allows one to reproduce approximately a complex turbulent initial flow. In particular, a continuous flow from a point source at one of the lateral walls is examined. This configuration resembles the discharge of a river into a lake or sea, or the generation of pollutants at coastal areas. A basic and rather intuitive result is that the discharged fluid spreads away from the wall more rapidly due to the turbulent interior flow than in the case without turbulence. It is shown that this behaviour depends on the Reynolds number and on the initial energetics of the turbulent field. The coastal discharge is transported when captured by strain-dominated areas between vortices, forming long filaments that spread into the flow domain. A number of techniques are proposed to quantify this transport.

Luis Zavala Sanson
CICESE

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