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Study of the turbulent diffusive flux for tracer dispersion in quasi-two-dimensional turbulent jets JULIEN R. LANDEL, DIMITRY FOURES, DAMTP, University of Cambridge, C.P. CAULFIELD, BPI & DAMTP, University of Cambridge — The study of turbulent jets in relatively enclosed geometries is relevant to rivers flowing into lakes. In the event of a spillage of pollutants into a river, it is critical to understand how these agents disperse with the flow in order to assess damage to the environment. Using the ensemble-averaged time-dependent advection-diffusion equation, we obtain an equation for the temporal and spatial evolution of the ensemble-averaged concentration of passive tracers injected in a steady turbulent quasi-two-dimensional jet. The turbulent flux of the concentration fluctuations is responsible for the lateral and streamwise dispersion in the jet. We reconstruct this second-order turbulent flux using two independent experimental measurements of the concentration field and of the time-averaged velocity field. We present results in the case of constant-flux releases of tracers in the jets. We find that the dispersion properties differ significantly between the lateral and streamwise direction. Due to a large streamwise dispersion a significant amount of tracers can be transported faster than the speed predicted by a simple top-hat advection model in the jet.

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