

Abstract Submitted
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Single series skewness representation for passive scalar advection in laminar pipe and channel flow¹ ROBERTO CAMASSA, University of North Carolina at Chapel Hill, Mathematics, FRANCESCA BERNARDI, Politecnico di Milano, Nuclear Engineering, RICHARD MCLAUGHLIN, KEITH MERTENS, University of North Carolina at Chapel Hill, Mathematics — In this talk, we present an exact single series representation for scalar skewness time evolution. Prior studies have naturally derived multiple nested Fourier series solutions which suffer from slow convergence and cloud physical interpretation. Judicious change of variables and complex residue theory lead to single series representation formulae for the moments along streamwise slices from which quantities such as variance and skewness can be reconstructed. Small and long time asymptotics will be discussed for the first three moments in both channel and pipe geometries in steady Poiseuille flows. Comparisons of theory with Monte Carlo simulations and preliminary experiments exhibit differences between channel and pipe flows in the skewness evolution.

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