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Mixing entropy in Dean flows PETRU FODOR, BRIAN VYHNALEK, MIRON KAUFMAN, Cleveland State University — We investigate mixing in Dean flows by solving numerically the Navier-Stokes equation for a circular channel. Tracers of two chemical species are carried by the fluid. The centrifugal forces, experienced as the fluid travels along a curved trajectory, coupled with the fluid incompressibility induce cross-sectional rotating flows (Dean vortices). These transversal flows promote the mixing of the chemical species. We generate images for different cross sections along the trajectory. The mixing efficiency is evaluated using the Shannon entropy. Previously we have found, P. S. Fodor and M. Kaufman, Modern Physics Letters B 25, 1111 (2011), this measure to be useful in understanding mixing in the staggered herringbone mixer. The mixing entropy is determined as function of the Reynolds number, the angle of the cross section and the observation scale (number of bins). Quantitative comparison of the mixing in the Dean micromixer and in the staggered herringbone mixer is attempted.

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