Advective-diffusive mixing in microchannels OLEKSANDR GORODETSKYI, MICHEL F.M. SPEETJENS, PATRICK D. ANDERSON, Eindhoven University of Technology, Netherlands — Laminar mixing is key to many processes in micro-devices and the mapping method is a proven and efficient approach to simulate and investigate mixing phenomena in realistic 3D geometries. However, the conventional mapping method is restricted to purely advective transport, while molecular diffusion is often significant, in particular in small-scale devices. A recent extension of the mapping method by Gorodetskyi et al. (Phys. Fluids, 2012, in press) allows inclusion of diffusion and thus greatly expands the application area of the technique. Diffusive mapping method enables in-depth analysis of the interplay between chaotic advection and diffusion in realistic systems by essentially the same procedure as successfully employed before for the purely convective approach. As a benchmark model for a realistic prototype system: the 3D staggered herringbone micro mixer is considered. Advective-diffusive mixing for various protocols of the mixer, that posses different dynamical properties, is investigated by means of the diffusive mapping method.

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