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Stirring inertial particles in three-dimensional flows in a cylindrical container with exactly counter-rotating lids. CRISTIAN ESCAURIAZA, FOTIS SOTIROPOULOS, University of Minnesota — Transport and mixing characteristics for the steady flow in a container with exactly counter-rotating lids have been recently studied [Lackey and Sotiropoulos, Phys. Fluids 18, 053601 (2006)] demonstrating the chaotic Lagrangian dynamics, and stirring rates for $300 \leq Re \leq 850$. The complex mixing characteristics of these flows can have a distinctive effect on the transport and stirring of inertial particles, which so far has not been fully explored in experimentally realizable flows. In this study, we carry out one-way coupling simulations to investigate in detail the inertial and gravity effects on spherical particles in these three-dimensional flows at different Reynolds numbers. Special emphasis will be given to the trapping of particles in invariant sets, and the interaction of inertial particles with the shear layer that produces the chaotic region. The effects of the Stokes and Froude numbers on stirring rates will be compared quantitatively with the previous results obtained for passive particles.

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