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Relation Between Mixing Efficiency and Geometrical Property of Stable Manifolds

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We examine the mixing of fluids associated with the chaotic motion of fluid particles due to the time-periodic flow between two eccentric cylinders caused by the time-periodic slow rotation of these cylinders. We examine the relation between the geomtrical property of the stable manifold of the unstable periodic points of the Poincaré map and the efficiency of the mixing. We find that the maximum stretching rate of fluid elements in a short time is large in the region where the density of the stable manifold is high, and that this stretching rate is small in the region where the curvature of this manifold is large. We also find that small blobs initially located at the region of high density of the stable manifold are mixed well in a short time.

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