On topological methods for constructing efficient mixings

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Abstract. Topological nature of stirring fluid by using finitely many rods is closely related to Nielsen-Thurston theory and braid theory. It is natural to expect that stirrings corresponding to pseudo-Anosov braids can mix up fluid efficiently. Making use of this idea, various mixing devices are proposed by several authors, and their efficiencies are confirmed by using computer simulations and experiments. In this talk, we introduce other mixing device with simple structures consisting of few gears, where the movements of the rods are hypotrochoid curves. We show that the braid corresponding to the movement is pseudo-Anosov type by using linking numbers of the closure of it and covering space. We believe that our device has an advantage for practical use from the viewpoint of the efficiency of the mixings.