

Abstract Submitted
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Effect of Liquid Viscosity on the Instability of Polygonal Pattern within a Hollow Vortex Core¹ AMR MANDOUR, HAMID AIT ABDERRAHMANE, GEORGIOS H. VATISTAS, LYES KADEM, HOI DICK NG, Concordia University — The present study deals with the effect of the viscosity on the speed and limits of endurance of the polygonal pattern, observed within the hollow-core vortex generated by rotating a flat disc near the bottom of a cylindrical tank. Previous investigations have used water, where the Froude number (Fr) appears as the main control parameter. Varying the viscosity of the fluid introduce another independent control parameter, Reynolds number (Re). Using image and signal processing techniques, the influence of these two control parameters on the dynamics of the polygonal pattern is thoroughly investigated. The viscosity of the rotated fluid is varied by mixing glycerol with water and the mixture viscosity is measured using Zahn cup viscometer. The disc rotational speed is measured and controlled accurately by a PID controller loop using LabView environment. A 3-D bifurcation diagram (Fr, Re, N), where the stability region of N -gon is delimited, is given. Moreover, the influence of the viscosity on the evolution of the N -gon speed is also obtained.

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