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A numerical study of the motion of a neutrally buoyant cylinder in two dimensional shear flow[1] TSORNG-WHAY PAN, Department of Mathematics, University of Houston, Houston, TX 77204, USA, SHIH-LIN HUANG, SHIH-DI CHEN, CHIN-CHOU CHU, CHIEN-CHENG CHANG, Institute of Applied Mechanics, National Taiwan University, Taipei 106, Taiwan, ROC — We have investigated the motion of a neutrally buoyant cylinder of circular or elliptic shape in two dimensional shear flow of a Newtonian fluid by direct numerical simulation. The numerical results are validated by comparisons with existing theoretical, experimental and numerical results, including a power law of the normalized angular speed versus the particle Reynolds number. The centerline between two walls is an expected equilibrium position of the cylinder mass center in shear flow. When placing the particle away from the centerline initially, it migrates toward another equilibrium position for higher Reynolds numbers due to the interplay between the slip velocity, the Magnus force, and the wall repulsion force.

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