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Dynamics of non newtonian vortex rings C. PALACIOS, I. MONSIVAIS, R. ZENIT, Universidad Nacional Autonoma de Mexico — The dynamics of formation and evolution of vortex rings created in a piston-cylinder arrangement is studied. The purpose of this investigation is to compare the formation process of Newtonian and non Newtonian vortex rings. These kind of vortices are present in many engineering applications and natural phenomena. The ratio of the piston displacement L and the nozzle diameter D determine the vortex size and evolution. Experiments with different conditions are presented: translation velocity of the piston, stroke ratio L/D, a Newtonian fluid and a shear thinning fluid. Measurements of the 2D velocity field were obtained with a PIV technique. The vortex circulation was computed considering a vortex identification scheme (Q criterion). In its evolution the vortex "feeds" of vorticity and increases its size; after some time its strength begins to dissipate. In the case of Newtonian fluids the results show that there is a critical number of L/D above which the circulation inside the vortex can not increase and remains constant (Gharib et al., 1998); in other words the vortex has a finite size. The critical number, called formation number, is between 3.5 and 4.5 for Newtonian fluids. We have observed that for a shear thinning fluid the critical number can increase considerably (up to twice the Newtonian value). Also, we observed that the shape of the rings is modified by the non-Newtonian properties of the fluid.

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