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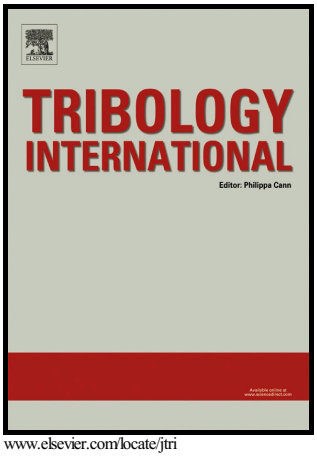

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Numerical Study on Skin Friction Reduction of Nanofluid Flows in Taylor-Couette System

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Abstract

In this study, the effects of nanoparticle addition in a vertical Taylor-Couette system are studied. The model is made up of two concentric vertical cylinders. The inner cylinder is rotating and the outer one is stationary. The base fluid is 5W-30 oil and the nanoparticles are made up of diamond, WS_2 and MoS_2. Single phase flow is assumed. The parameters considered are the nanoparticle concentration and the flow Reynolds number. The results showed that adding nanoparticles to the base fluid in laminar flow regime affect skin friction lightly. However, the skin friction decreased in turbulent flow regime appreciably. The maximum decrease is about 13.8% with WS_2-oil nanofluid and the minimum amount accounts by using diamond nanoparticles.

Keywords: Lubrication; Journal bearing; Taylor-Couette system; Nanoparticle.