## Taylor-Couette Flow of an Oldroyd-B Fluid in an Annulus Due to a Time-Dependent Couple

Corina Fetecau<sup>a</sup>, Muhammad Imran<sup>b</sup>, and Constantin Fetecau<sup>b</sup>

<sup>b</sup> Department of Theoretical Mechanics, Technical University, Iasi 700050, Romania <sup>b</sup> Abdus Salam School of Mathematical Sciences, GC University, Lahore, Pakistan

Reprint requests to C. F.; E-mail: cfetecau@yahoo.de or fetecau\_constantin@yahoo

Z. Naturforsch. 66a, 40-46 (2011); received March 23, 2010/revised June 16, 2010

Taylor-Couette flow in an annulus due to a time-dependent torque suddenly applied to one of the cylinders is studied by means of finite Hankel transforms. The exact solutions, presented under series form in terms of usual Bessel functions, satisfy both the governing equations and all imposed initial and boundary conditions. They can easily be reduced to give similar solutions for Maxwell, second-grade, and Newtonian fluids performing the same motion. Finally, some characteristics of the motion, as well as the influence of the material parameters on the behaviour of the fluid, are emphasized by graphical illustrations.

Key words: Oldroyd-B Fluid; Velocity Field; Shear Stress; Time-Dependent Couple.