

The Motion of Fractional Order Jeffrey Fluid Model

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Abstract: This paper presents some new exact solutions corresponding to three unsteady flow problems of a generalized Jeffrey fluid [1-3] produced by a flat plate between two side walls perpendicular to the plate. The fractional calculus approach in the governing equations is used. The exact solutions are established by means of the Fourier sine transform and discrete Laplace transform. The series solution of velocity field and the associated shear stress in terms of Fox H-functions, satisfying all imposed initial and boundary conditions, have been obtained. The similar solutions for ordinary Jeffrey fluid, performing the same motion, appear as limiting case of the solutions are obtained here. Also, the obtained results are analyzed graphically through various pertinent parameter.

Keywords: Generalized Jeffrey fluid, Fractional derivatives, Fox H-functions, Discrete Laplace transform.

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