

Energetic balance for the flow of a second grade fluid due to a plate subject to a shear stress

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Abstract

Exact and approximative expressions for dissipation, the power due to the shear stress at the wall and the boundary layer thickness corresponding to the unsteady motion of a second grade fluid, induced by an infinite plate subject to a shear stress, are established. For $\alpha_1 \rightarrow 0$, the similar results for Newtonian fluids performing the same motion, are obtained. The results that have been here obtained are different of those corresponding to the Rayleigh-Stokes problem. A series solution for the velocity field is also determined. Its form, as it was to be expected, is identical to that resulting from the general solution by asymptotic approximations.

Keywords: Second grade fluid; Energetic balance; Dissipation; Kinetic energy; Power.

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