

Starting solutions for the oscillating motion of a Maxwell fluid in cylindrical domains

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Abstract

The exact solutions for the motion of a Maxwell fluid due to longitudinal and torsional oscillations of an infinite circular cylinder are determined by means of the Laplace transform. These solutions are presented as sum of the steady-state and transient solutions and describe the motion of the fluid for some time after its initiation. After that time, when the transients disappear, the motion is described by the steady-state solution which is periodic in time and independent of the initial conditions. Finally, by means of graphical illustrations, the required times to reach the steady-state are determined for sine, cosine and combined oscillations of the boundary.

Key words: Maxwell fluid; Oscillating motion; Starting, transient and steady-state solutions.

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