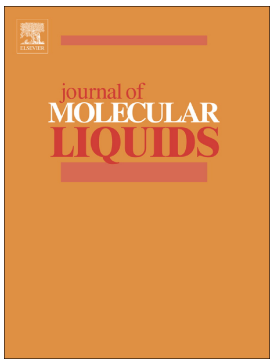

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A molecular dynamics study on transient non-Newtonian MHD Casson fluid flow dispersion over a radiative vertical cylinder with entropy heat generation

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Abstract:

In the present research article, the transient radiative free convective hydromagnetic Casson fluid flow past a vertical cylinder with entropy heat generation is analysed numerically. The mathematical model of this problem is constituted by highly time-dependent non-linear coupled equations and they are resolved by an efficient unconditionally stable implicit scheme. The time histories of average values of momentum and heat transport coefficients, entropy generation and Bejan number, as well as the steady-state flow variables are discussed for several values of non-dimensional parameters arising in the flow equations. The results indicate that entropy generation parameter and Bejan number upsurges with rising values of Casson fluid parameter, viscous dissipation parameter, group parameter and Grashof number, whereas the reverse trend is observed for radiation and magnetic parameters. Also, it is viewed that the variation of entropy and Bejan lines occur in the proximity of the hot cylindrical wall only. Finally, a comparison between the Casson and Newtonian fluid is made based on the obtained numerical results of the present study and this has important implications in industrial thermal materials processing operations.

Keywords: Casson fluid; entropy generation; MHD; vertical cylinder; thermal radiation; finite difference method.

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