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Boundary layer flow heat and mass transfer study of Sakiadis flow of viscoelastic nanofluids using hybrid neural network-particle swarm optimization (HNNPSO)

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Abstract
Viscoelastic nanofluids equations are mainly ill-posed at the system boundaries, and hence, achieving a numerical solution faces serious challenges. In addition, the presence of very fine nanoparticles (with the mean size of 100 nm and lower) in the fluid leads to new phenomena of heat and particle transfer, which highly increases the non-linearity and complexity of the behavior of the resulting viscoelastic nanofluids. Thus, new analytical or semi-analytical methods are highly demanded to deal with flow and heat transfer of viscoelastic nanofluids. In this study, by a new idea using intelligent optimization methods, a new and unique method is presented to solve the differential equations governing flow and heat transfer of viscoelastic nanofluids. Using intelligent optimization, it is attempted to move towards an optimum solution by changing a trial solution that satisfies both the governing equations and the boundary conditions as well. The results indicate the accuracy and simplicity of the method. © 2017

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