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# Entropy Generation Minimization in a Porous Pipe Heat Exchanger under MHD Using Cattaneo-Christov Heat Flux

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**Abstract :** This article is devoted to studying the second law analysis of the Cattaneo-Christov heat flux for non-Newtonian fluid on a moving porous pipe intensification of the magnetic field and heat source/sink. The non-Newtonian fluid is considered to have Maxwell-fluid characteristics. The Cattaneo-Christov model takes into account the specific relaxation time for heat transfer. The main causes that are responsible for creating entropy generation are viscous dissipation, heat transfer, and joule heating. An analytical method, the Homotopy Analysis Method (HAM), is utilized to solve the non-linear governing equations of the underlying model. Mathematical results are shown with graphs and tables. In this work, all those parameters are sorted out which are responsible for an increase or decrease in entropy generation. Namely, the porosity, magnetic field effects, and heat source/sink rate are in the former category, and Cattaneo-Christov relaxation time is in the latter one. These results are new contributions in the case of internal flow in the pipe and would be helpful for reducing the entropy generation strategies.

**Keywords :** Cattaneo-Christov heat flux, entropy generation analysis, heat source / sink, joule heating, non-newtonian fluid, porous pipe
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