

## Heat transfer behaviour of mixing nano-non-Newtonian fluid in a chaotic micromixer

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**Abstract** – The hydrodynamic and thermal behaviors of Nano-Non-Newtonian fluids were examined using three-dimensional numerical simulations of a unique passive micromixer. To comprehend the quantitative and qualitative fluid fraction distributions with temperature homogenization, mass and heat transport properties of two heated fluids have been examined. For varied Reynolds numbers, the influence of fluid behavior and various Al<sub>2</sub>O<sub>3</sub> nanoparticle concentrations on the pressure drop and thermal mixing capabilities were examined. Using CFD, the simulation of performance enhancement was run in intervals of varying Nanoparticle concentrations with Power-law index (n). In terms of fluid homogenization, the proposed micromixer demonstrated a mixing energy cost of 60% comparable to that realized for a recent micromixer (2021y). According to the analysis, for high nanofluid.

**Keywords** – Nano-Non-Newtonian Fluid, Mass Mixing, Thermal Mixing, Micromixer, Reynolds Number, Mixing Energy Cost.

### Graphical abstract

