



# Second law analysis for MHD slip flow for Williamson fluid over a vertical plate with Cattaneo-Christov heat flux

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## Abstract

In the present investigation, entropy generation on Williamson fluid flow and velocity slip with non-linear chemical reaction across permeable and vertical plate is embraced. Arithmetic simulation is elucidated by exercising R–K 4<sup>th</sup> order technique along with shooting method in MATLAB syntax for mass concentration and momentum equations. The effects of physical quantities like velocity, energy, and mass are analysed using visual and numerical notations. Analysis discovered that entropy generation rate is improved for Magnetic field parameter and chemical reaction and reverse effects are observed on the quantity of porosity parameter, Williamson fluid parameter and slip parameter. Furthermore, entropy generation rate enhances for higher values of Brinkman number. The acquired results show that they are remarkable agreement with those reported earlier in the open literature.



## Keywords

Vertical plate; Porous medium; Williamson fluid; Slip condition

## Nomenclature

$$Br = \frac{\mu b^2 x^2}{k \Delta T}$$

Brinkman number

$$d_1 = L_1 \sqrt{\frac{b}{\nu}}$$

Velocity slip parameter