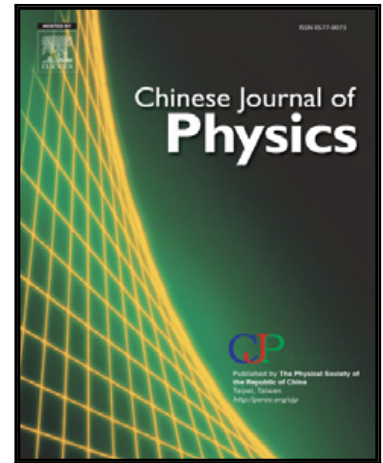


## Accepted Manuscript

An analysis of the semi analytic solutions of a viscous fluid with old and new definitions of fractional derivatives

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PII: S0577-9073(17)31492-2  
DOI: <https://doi.org/10.1016/j.cjph.2018.08.017>  
Reference: CJPH 615



To appear in: *Chinese Journal of Physics*

Received date: 20 November 2017  
Revised date: 11 July 2018  
Accepted date: 11 August 2018

Please cite this article as: M.A. Imran , Shakila Sarwar , M. Abdullah , I. Khan , An analysis of the semi analytic solutions of a viscous fluid with old and new definitions of fractional derivatives, *Chinese Journal of Physics* (2018), doi: <https://doi.org/10.1016/j.cjph.2018.08.017>

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## Highlights

- Mathematical modeling of a viscous fluid is proposed with fractional derivatives.
- Semi analytical solutions are obtained via the Laplace transform method.
- The heat, mass and skin friction coefficients are also calculated.
- Transfer rates of the Caputo-Fabrizio derivative have higher values than the Caputo derivative.
- The fractional viscous fluid with the Caputo-Fabrizio derivative has a higher velocity than with the Caputo derivative.

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