

عنوان مقاله:

Dufour and Soret Effects on Unsteady Heat and Mass Transfer for Powell-Eyring Fluid Flow over an Expanding Permeable Sheet

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خلاصه مقاله:

In the present analysis, the Dufour and Soret effects on unsteady heat-mass transfer of a viscous incompressible Powell-Eyring fluids flow past an expanding/shrinking permeable sheet are reported. The fluid boundary layer develops over the variable sheet with suction/injection to the non-uniform free stream velocity. Under the symmetry group of transformations, the governing equations along with three independent variables, are converted into a system of PDEs with two independent variables. Finally, by employing the order-reduction technique the PDEs are transformed into ODEs, which are then solved numerically. The results are presented graphically and analyzed. The main advantage of this technique is that without any prior knowledge, one can easily find the scaling transformations, expanding velocity, suction/injection velocity, and free-stream velocity. From computed numerical results many important findings are obtained. Most importantly, thermal and concentration overshoots are found for larger values of Dufour and Soret numbers, respectively. Also, thermal and concentration crossing over found for different values of Soret and Dufour numbers, respectively.

کلمات کلیدی:

Unsteady heat and mass transfer, Soret and Dufour effects, Powell-Eyring fluid, expanding sheet, symmetry analysis

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