# Thermal Radiation Effects on the Flow by an Exponentially Stretching Surface: a Series Solution

Sohail Nadeem[a], Tasawar Hayat[a,b], Muhammad Yousaf Malik[a], and Saeed Ahmed Rajput[a]

[a] Department of Mathematics, Quaid-i-Azam University 45320, Islamabad 44000, Pakistan
[b] Department of Mathematics, Colledge of Sciences, King Saud University, P. O. Box 2455, Riyadh 11451 Saudi Arabia

Reprint requests to S. N.; E-mail: snqau@hotmail.com

Z. Naturforsch. **65a,** 495 – 503 (2010); received January 19, 2009 / revised July 14, 2009

This article analytically describes the thermal radiation effects on the flow and heat transfer characteristics. The flow in a second-grade fluid is created due to an exponentially porous stretching surface. The series solutions of velocity and temperature are developed by a homotopy analysis method. The heat transfer results are obtained for the two cases, namely, (i) the prescribed exponential order surface temperature (PEST) and (ii) the prescribed exponential order heat flux (PEHF). It is noticed that the temperature profile in both cases decreases when radiation parameter is increased.

*Key words:* Second-Grade Fluid; Porous Stretching Surface; Series Solutions.