1035-65-734 **Abhinandan Chowdhury*** (axc3435@louisiana.edu), 200 Oakcrest Drive, Apt No. - E-254, Lafayette, LA 70503, and **Christo I. Christov**, Dept. of Mathematics, University of Louisiana at Lafayette, P.O. Box - 1010, Lafayette, LA 70504. *Perturbation of a Gradient Temperature Field Due to the Presence of Two Spheres.*

We consider the problem of heat conduction in an unbounded media of a given conductivity, containing two non-overlapping spherical inclusions of different material. A constant linear gradient at infinity is assumed which has significance for modeling the effective conduction of suspensions. At the sphere's surfaces, both the temperature and the heat flux are required to be continuous. The problem is reformulated in bi-spherical coordinates and a novel spectral method is devised based on expansion into series with respect to Legendre polynomials. The coefficients are exponential functions of the other coordinate. We prove that the convergence of the spectral expansion is exponential which allows us to keep a small number of terms. For each configurations of the spheres and the gradient at infinity, the system of linear equations for the spectral coefficients is solved numerically and the temperature is defined as a function of the bi-spherical coordinates. Then the coordinate transformation is reversed to obtain the temperature as function of the Cartesian coordinates. The results are presented graphically and their significance for the applications is discussed. (Received September 14, 2007)