# Interaction of Surface Radiation with Conjugate Convection from Heat Generating Slabs, Cylinders and Spheres

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**Abstract**

In the present paper, the results of a numerical study of the fundamental problem of steady-state heat conduction, in each of the three basic geometries, vig., slab, cylinder and sphere, with volumetric heat generation, subjected to heat dissipation by convection and radiation at the surfaces, are reported. The temperature distribution in each case has been derived using a novel algorithm based on energy balance on a finite volume element, coupled with Newton-Raphson method (in place of the conventional approach that involves solving the Poisson's equation). The effects of various parameters, such as thermal conductivity, convection heat transfer coefficient, surface emissivity and volumetric heat generation, on temperature distribution in all three geometries have been analysed in great detail. Based on a large set of about 350 data in each case, correlations have been evolved for the non-dimensional local temperature in each of the three geometries as a function of various pertinent parameters.