# Thermal Modelling of Lunar Surface at Regional Scales Using COMSOL Multiphysics®

K. Durga Prasad [1], S.V.S. Murty [1], V. K. Rai [1]

[1] Physical Research Laboratory, Ahmedabad, India

## Abstract

The thermal behavior/heat flow of the Moon provides us an insight into its geophysical character and thermal evolution. The thermal behavior within the uppermost (top few meters) regolith layers is more complex due to their complex geometric, thermal and radiative properties. In order to have a better understanding of the phenomenon, the thermal behavior of the lunar surface at regional scales is being modelled using COMSOL Multiphysics® Heat Transfer Module. The model assumes heat transfer phenomenon in solids and porous media with conduction and radiation as the modes of heat transfer representing a situation similar to that of the lunar regolith. Appropriate boundary conditions for solar insolation at surface (as a forcing parameter) and vacuum environment on the Moon have been considered for carrying out all the simulations. The simulations were carried out for different stratigraphies, geometries and physical properties of few representative regions on the Moon. From our preliminary work, we have observed a significant dependence of all the parameters on the surface thermal behavior of the Moon. Results of one of these simulations for a multi-layered surface with presence of a surface irregularity (crater) are shown in figure 1. Details of the model, simulation approach and some initial results of our work will be presented.

# Figures used in the abstract

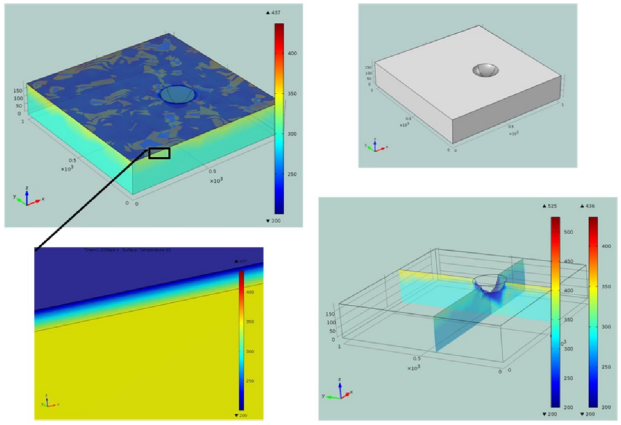

**Figure 1**: Results.