**Introduction:** This poster presents a numerical analysis on the thermal resistance of a sample, consisting of two cavities surrounding a Multi-Layer Reflective Insulation (MLRI) material, under various angles (α) and for downward and upward heat flows.

**Computational Methods:** In the applied Laminar Flow module, the Navier Stokes equations for an incompressible flow a time-dependent system were defined for air by:

\[
\rho_{air} \frac{\partial u}{\partial t} + \rho_{air} (u \cdot \nabla)u = -p \nabla + \nabla \cdot (\mu (\nabla u + (\nabla u)^T)) + F \\
\frac{\partial \rho_{air}}{\partial t} + \nabla \cdot u \rho_{air} = 0
\]

In turn, the equations in the Heat Transfer module \( n \) were defined for material by:

\[
\rho_n c_n \frac{\partial T}{\partial t} + \nabla \cdot (-k_n \nabla T) = -\rho_n c_n u \cdot \nabla T
\]

The Boussinesq approximation was applied and air was considered as an ideal gas:

\[
\rho_{air} = \rho_{ref}\beta_p (T_{air} - T_{ref})
\]

Consecutively, \( F \) is defined as:

\[
F = \begin{bmatrix} x \\ y \end{bmatrix}, x = -\rho_{air} g (\sin \alpha); y = -\rho_{air} g (\cos \alpha)
\]

**Results:** The heat transfer by radiation in both cavities was greatly reduced by the highly reflective surfaces of the MLRI material. Meanwhile, convective heat transfer gained a more dominant role on the heat transfer through the sample since the radiative heat transfer in the cavities is highly decreased.

**Conclusions:** For practical application, MLRI materials are probably best placed in the floor beneath a building so that the highest thermal resistance is attained, since convective heat transfer is minimized due to the upward heat flow.

**References:**