

# **SIMULATION OF CONJUGATE HEAT TRANSFER AND NATURAL CONVECTION IN THE UNFILLED CAVITY-WALLS OF BUILDING USING ADINA-CFD**

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## **ABSTRACT**

This paper deals with the simulation of conjugate heat transfer and natural convection phenomenon in different cavity walls and its effect on the thermal insulation of building. The simulations are carried out by creation of preliminary models in CAD and detailed models with the desired boundary conditions in ADINA-CFD and analyzed for the heat transfer and heat movement inside the cavity present between various wall materials, commonly used in cavity walls. The type of simulation adopted for this research is the Heat transport simulation using Heatline Visualization Technique and the heat barrier effect. This paper also focuses on the comparison of empirical values on the conjugate heat transfer and natural convection of cavity walls with the simulation result. From the literature, the effect of heat barrier location on overall heat transfer is large for low Rayleigh number cavities. The average Nusselt number also reduces with the due to the heat barrier. These characteristics are well observed in the conducted simulation and from the simulation, the wall cavity with Wood and Brick configuration is proved to be best material combination for the cavity walls for thermal insulations.

**KEYWORDS:** ADINA-CFD, Conjugate Energy Efficiency, Heat Transfer, Heatline Visualization Technique, Natural Convection, Rayleigh Number