

Coupling Heat Transfer by Natural Convection and Thermal Radiation in a Storage Tank of LNG

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Abstract : A numerical simulation of natural convection double diffusion, coupled with thermal radiation in unsteady laminar regime in a storage tank is carried out. The storage tank contains a liquefied natural gas (LNG) in its gaseous phase. Fluent, a commercial CFD package, based on the numerical finite volume method, is used to simulate the flow. The radiative transfer equation is solved using the discrete coordinate method. This numerical simulation is used to determine the temperature profiles, stream function, velocity vectors and variation of the heat flux density for unsteady laminar natural convection. Furthermore, the influence of thermal radiation on the heat transfer has been investigated and the results obtained were compared to those found in the literature. Good agreement between the results obtained by the numerical method and those taken on site for the temperature values.

Keywords : tank, storage, liquefied natural gas, natural convection, thermal radiation, numerical simulation

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