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Numeric Modeling of Condensation of Water Vapor from Humid Air in a Room

Authors : Nguyen Van Que, Nguyen Huy The

Abstract : This paper presents combined natural and forced convection of humid air flow. The film condensation of water vapour on a cold floor was investigated using ANSYS Fluent software. User-defined Functions(UDFs) were developed and added to address the issue of film condensation at the surface of the floor. Those UDFs were validated by analytical results on a flat plate. The film condensation model based on mass transfer was used to solve phase change. On the floor, condensation rate was obtained by mass fraction change near the floor. The study investigated effects of inlet velocity, inlet relative humidity and cold floor temperature on the condensation rate. The simulations were done in both 2D and 3D models to show the difference and need for 3D modeling of condensation.

Keywords : heat and mass transfer, convection, condensation, relative humidity, user-defined functions
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