A NUMERICAL STUDY OF THE EFFECTS OF OVERHANGS ON THE WIND-DRIVEN RAIN WETTING OF BUILDING FACADES

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Abstract

Roof overhangs are used traditionally to reduce the amount of rainwater that is deposited on building facades by wind. This thesis investigates the effects of overhangs on the wind-driven rain (WDR) wetting of facades, which have not been studied in detail before, using CFD-based numerical simulation. The commercial CFD package ANSYS FLUENT is used to solve the multiphase flow of wind and rain around buildings. A MATLAB code is developed to post-process the CFD results and calculate the WDR parameters. The numerical scheme is validated by comparison to previously published results and field measurements. Roof overhangs are shown to be effective in protecting facades from WDR, especially at upper parts. This protection is highly dependent upon the overhang size, wind speed, wind direction and the building geometry, but is slightly affected by the rainfall intensity. Physical explanations are presented for the observations and a new global measure of the effectiveness of overhangs is introduced.