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Modelling of Reinforced Concrete Slabs in Fire

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Abstract

A numerical procedure for the thermal analysis of RC slabs at elevated temperatures is the subject of this study, where the moisture increase due to the so-called moisture clog occurring in the cooler parts of reinforced concrete (RC) slabs is introduced as well. Starting from a systematic investigation on the existing concrete constitutive laws available in the literature and in the codes, improved concrete constitutive laws are proposed to describe concrete thermal and mechanical properties at elevated temperatures. The proposed laws – called also models - are validated against well-documented full- and small-scale tests on simply-supported RC slabs. Parametric analyses on the behaviour of RC slabs in fire are carried out as well, to clarify the role that the different constitutive laws may have in the numerical prediction of RC slabs behaviour under fire conditions.

Keywords: Reinforced concrete slab; Fire resistance; Numerical analysis; Concrete constitutive laws; Moisture content

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