The bond behaviour of reinforced concrete members at elevated temperatures

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Abstract:

This paper presents a comprehensive parametric study on the bond behaviour of reinforced concrete members under fire conditions. The study identified some most important factors affecting the bond characteristics between concrete and reinforcement within reinforced concrete beams and slabs at elevated temperatures. These factors are: steel bar yielding, concrete cover, concrete compressive strength and concrete spalling. The results indicated that concrete cover has a great influence on the bond strength, by providing the confinement to the reinforcement for both the reinforced concrete beam, and the slab. The impact of concrete spalling on the beam is very significant, for both full bond and partial bond cases. The behaviour of the reinforced concrete frame under different fire scenarios was also investigated – assuming a two hours fire resistance rate. Those results indicated that isolated members behave differently, compared to those members within a building. Indicating that continuity of the members and its surrounding cooler structures significantly affects the behaviour of the members within the fire compartment.