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## NUMERICAL STUDY OF THE BEHAVIOR OF RC BEAM AT HIGH TEMPERATURES

**Abstract.** The numerical study focuses on analyzing the structural response of reinforced concrete (RC) beams at high temperatures. Gaining more insight into the behavior of reinforced concrete (RC) structures at high temperatures and the material properties of steel reinforcement and concrete are the main goals of this research. To conduct this analysis, finite element analysis (FEA) using the ABAQUS software package is adopted. FEA allows for the simulation of the behavior of the RC beam under fire by inputting relevant parameters, such as material properties, dimensions, and temperature. The program calculates the temperature distribution within the structure and predicts the resulting structural responses. Two phases are applied: before and after exposure to fire. Both normal-strength concrete (NSC) beams and high-strength concrete (HSC) beams are considered. The results indicate that high temperatures have a detrimental effect on the overall behavior of concrete beams. At 600°C, the residual strength of HSC beams is shown to be twice that of NSC beams.

**Keywords:** beam, concrete, fire, strength, ABAQUS.

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## ЧИСЛЕННОЕ ИССЛЕДОВАНИЕ ПОВЕДЕНИЯ ЖЕЛЕЗОБЕТОННЫХ БАЛОК ПРИ ВЫСОКИХ ТЕМПЕРАТУРАХ

**Аннотация.** Численное исследование сосредоточено на анализе структурной реакции железобетонных (RC) балок при высоких температурах. Целью этого исследования является более глубокое понимание того, как железобетонные конструкции ведут себя при воздействии повышенных температур и как это влияет на свойства материалов бетона и стальной арматуры. Для проведения этого анализа используется анализ методом конечных элементов (FEA) с использованием пакета программного обеспечения ABAQUS. FEA позволяет моделировать поведение RC-балки под пожаром путем ввода соответствующих параметров, таких как свойства материала, размеры и температура. Программа рассчитывает распределение температуры внутри конструкции и прогнозирует результирующие структурные реакции. Применяются две фазы: до и после воздействия пожара. Рассматриваются балки как из нормального бетона (NSC), так и из высокопрочного бетона (HSC). Результаты показывают, что высокие температуры оказывают пагубное влияние на общее поведение бетонных балок. Показано, что при 600°C остаточная прочность балок HSC в два раза выше, чем балок NSC.

**Ключевые слова:** балка, железобетон, пожар, прочность, ABAQUS.

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