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Experimental Investigation of Ultra High Performance Fiber Reinforced Concrete and its Applications in Building

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Ultra High Performance Fiber Reinforced Concrete (UHPFRC) is an advanced cementitious material with high strength and excellent durability. It has many advantages over the other types of concrete. A key aspect of structural design is the determination of material-level properties that appropriately describe the material's intrinsic response when subjected to structural loads. This project presents the experimental research regarding the mechanical properties of ultra high performance fiber reinforced concrete. An omnipresent problem worldwide is finding a parking space to park a vehicle in crowded areas. Due to the non-availability of better parking facilities in the metropolitan area, vehicles remain parked on the road, leading to traffic jams and inconvenience to public spaces. In the present condition, road area has remained constant and traffic count has increased enormously. This is creating chaos at various locations in metro cities. The multi-storey parking facility would solve the problem of parking in the area. The main requirement of a multi-storey parking Building is for a large, intermediate column-free space to allow maximum maneuverability of vehicles into parking bays. The scope of this project is to analyse and design G+6 storeyed parking building having intermediate column-free space to be constructed over 45m DP road width and 180m road length. A detailed study of ultra high performance fiber reinforced concrete is conducted and its application in buildings is under study. The assessment of compression, tension and flexural properties of UHPFRC is executed according to existing testing methods. The experimental results are then used to propose suitable mechanical models and design parameters that are foundational for the structural-level application of UHPFRC. The architectural building plan is prepared after a detailed study. The 36m girder is designed to provide the intermediate column free space in the building and the application of UHPFRC is proposed. Ultimately, the outcome of this project holds the potential for the use of UHPFRC in building and providing solutions for the greater public good. The extensive research on UHPC's preparation techniques, material properties, structural design methods and specifications will promote wider applications and reducing the material cost.

Ultra high performance fiber reinforced concrete, Mechanical properties, Column-free space, Multi-storeyed parking building.

Concrete Technology, Structural Engineering