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Rheological Properties of Self-Compacting Concrete with Mineral Admixtures

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Research article Page: 01-17

Rheological properties of self-compacting concrete (SCC) with mineral admixtures like fly ash, ground granulated blast furnace slag (GGBS), and micro-silica (MS) are characterized by yield stress (τ_0) typically 20-60 Pa and plastic viscosity (η) of 30-100 Pa·s to ensure high flowability without segregation. Mineral admixtures reduce water demand and improve particle packing, with GGFS and fly ash lowering yield stress by 20-40% at 20-40% replacement levels, enhancing slump flow diameters to 650-750 mm. Micro-silica increases viscosity but boosts cohesion, while marble dust or limestone powder optimizes rheology via filler effects, maintaining V-funnel times under 12 s. These admixtures enable sustainable SCC production, balancing fresh-state performance with hardened durability under ambient curing...... [For more click here].

Retrofitting strategies for existing buildings

N. Olhoff & C. Fleury, W. Stadler & Marta Rey-López

Research article Page: 18-33

Retrofitting strategies for existing buildings enhance seismic, wind, and energy performance while minimizing disruption and costs, often combining structural upgrades with sustainability measures. Global shear walls, steel bracing, and concrete jacketing add stiffness and strength, effectively reducing drifts in RC frames and masonry infills by 50-70% under design earthquakes. Advanced techniques like base isolation (rubber bearings), supplemental dampers (viscous, friction), and fiber-reinforced polymers (FRP) provide ductility and energy dissipation without heavy interventions, …… [For more click here]

Spectral finite element methods in dynamics

Haojie Xu, Yuqian Fan

Research article Page: 34-52

Spectral finite element methods (SFEM) in dynamics extend classical finite element analysis by using exact wave solutions and frequency-dependent dynamic shape functions derived from governing differential equations, enabling precise modeling of wave propagation with minimal elements. Unlike polynomial-based FEM, which requires mesh refinement at high frequencies, SFEM employs Fourier transforms to handle broadband excitations, assembling exact spectral stiffness matrices at discrete frequencies for beams, plates, frames, and continua. This approach excels in transient dynamics, structural health monitoring, and seismic analysis, capturing all wave modes , …… [For more click here]

Long-term aging effects on tensile characterization of steel fibre reinforced concrete

W. Stadler & V. Krishnan
Research article Page: 53-68

Long-term aging generally modifies the tensile response of steel fibre reinforced concrete (SFRC) by altering both the cementitious matrix and the fibre–matrix interface. Over years of service, microstructural densification of the matrix can increase the limit of proportionality and initial tensile strength, while creep and shrinkage still promote crack development. Aging often enhances fibre–matrix bond, which may increase post-cracking residual tensile capacity, but corrosion of exposed steel fibres in aggressive environments can gradually reduce their bridging efficiency. Overall, the long-term tensile performance of SFRC depends on exposure conditions and temperature, with moderate environmental actions showing good retention of residual tensile capacity, whereas severe corrosion or high-temperature histories can cause notable degradation……. [For more click here]

Structural reliability analysis under extreme loads

S. H. Han, P. B. Thanedar, R. H. Plaut & P. Morelle
Research article Page: 69-81

Structural reliability analysis under extreme loads evaluates the probability that a structure survives events like earthquakes, blasts, winds, or floods without failure. It models resistance (capacity) and load effects as random variables, computing failure probability via the limit state function where resistance exceeds demand. Common methods include First-Order Second-Moment (FOSM), First-Order Reliability Method (FORM), Monte Carlo simulation, and time-dependent approaches accounting for deterioration and load growth ……. [For more click here]