Research article, Type : Subscription ***Volume:02***

Sustainable Design and Performance Evaluation of Recycled Aggregate Concrete in High-Rise Structures

Katrin Wieneke, S. Shao & D. Carsten

Research article Page: 01-21

Sustainable design of recycled aggregate concrete (RAC) in high-rise structures promotes environmental benefits by reducing landfill waste and virgin resource extraction through the reuse of construction and demolition debris. Performance evaluations reveal that RAC maintains adequate compressive strength and durability for structural applications when replacement levels stay below 30-50%, though it often shows slightly lower modulus of elasticity compared to natural aggregate concrete. High-rise implementations, such as twin tower studies, demonstrate comparable carbon footprints and seismic performance with optimized mixes incorporating supplementary cementitious materials. ……. [For more click here]

Non-destructive testing techniques for concrete structures

Hikaru Nakamura & Sahil Rajput

Research article Page: 22-41

Non-destructive testing (NDT) techniques for concrete structures evaluate strength, durability, uniformity, and internal defects without damaging the material, making them vital for in-service assessments. Primary methods include rebound hammer testing, which gauges surface hardness to estimate compressive strength; ultrasonic pulse velocity (UPV), measuring sound wave travel time to detect cracks, voids, or honeycombing; and penetration resistance tests like the Windsor probe, embedding steel pins for relative strength correlation. Additional approaches such as ground-penetrating radar …… [For more click here]

Performance-based seismic design of reinforced concrete buildings

Marek Foglar, David B. Clarke, Mark West

Review Paper Page: 42-59

Abstract: Performance-based seismic design of reinforced concrete buildings focuses on achieving predefined performance objectives, such as operational continuity, immediate occupancy, life safety, or collapse prevention, under specific earthquake intensities rather than relying solely on force-based limits. This approach uses nonlinear static (pushover) analysis or time-history analysis to predict building response, including plastic hinge formation and inter-story drifts, ensuring predictable damage levels. Engineers select target displacements and verify them against capacity curves derived from structural modeling, often iterating designs to meet owner-specific risk tolerances. Unlike prescriptive codes, it provides transparency on expected performance, making it ideal for critical infrastructure in high-seismic zones…… [For more click here]

Wind-induced vibrations and control in tall structures

P. Fleury

Research article Page: 60-76

Abstract: Wind-induced vibrations in tall structures arise primarily from dynamic wind loads like across-wind gusts, vortex shedding, and buffeting, which can cause occupant discomfort through excessive accelerations and sway. Control strategies include aerodynamic shaping (tapered forms, chamfered corners, or openings to disrupt vortex formation), mass and stiffness modifications via outriggers or belt trusses, and supplemental damping devices. Passive systems dominate practical applications: tuned mass dampers (TMDs) reduce peak responses by 30-50% by counteracting motion at the fundamental frequency,. …… [For more click here]

Non-destructive testing techniques for concrete structures

Hikaru Nakamura & Sahil Rajput

Research article Page: 77-89

Abstract: Non-destructive testing (NDT) techniques for concrete structures assess material properties like strength, density, uniformity, and defects without causing damage, making them essential for in-service inspections and quality control. Key methods include the rebound hammer test, which measures surface hardness to estimate compressive strength; ultrasonic pulse velocity (UPV) testing, where high-frequency sound waves detect internal voids, cracks, or delaminations by analyzing travel time through the concrete; and penetration resistance tests like the Windsor probe, embedding steel pins to gauge relative hardness. Ground-penetrating radar (GPR) and impact-echo methods further identify rebar location, cover depth, and subsurface anomalies, with results calibrated Non-destructive testing (NDT) techniques for concrete structures assess material properties like strength, density, uniformity, and defects without causing damage, making them essential for in-service inspections and quality control. Key methods include the rebound hammer test, which measures surface hardness to estimate compressive strength; ..…… [For more click here]

Full-scale lateral impact testing of prestressed concrete girder

S. C Mishra & B.C Ray

Research article Page: 90-107

Abstract: Full-scale lateral impact testing of prestressed concrete girders simulates real-world vehicle collision scenarios, such as over-height truck impacts on bridge undersides, using purpose-built facilities with impact carts or bogies. Tests typically involve AASHTO Type I or MoDOT Type II girders (40-46 ft long), instrumented with strain gauges, accelerometers, and high-speed cameras to capture dynamic responses including local denting, concrete spalling, tendon rupture, and residual capacity…… [For more click here]