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Retrofit Techniques for Masonry Infills in RC Frames

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Research article Page: 01-19

Retrofit techniques for masonry infills in RC frames aim to enhance ductility, energy dissipation, and prevent brittle failures like out-of-plane collapse or frame soft-story mechanisms. Fiber-reinforced polymer (FRP) sheets, such as CFRP bonded to infill surfaces and anchored to frames, boost lateral capacity by 300% and promote elastic response under cyclic loading. Engineered Cementitious Composites (ECC) sprayed on infills increase confinement and shear strength, delaying strength degradation while avoiding frame shear failures. Cross-laminated timber (CLT) panels mechanically fastened to frames offer sustainable retrofitting, improving stiffness and drift capacity in full-scale tests. Composite jacketing of columns/beams combined with infill crack injection or K-bracing ensures ductile failure modes with minimal added mass. ……. [For more click here]

Mechanical Characterization of 3D-Printed Concrete Elements

Ali Mujahidin, Indrianawati Usman, Yetty Dwi Lestari, Ahmad Saifurriza Effasa & Robert S. Lee

Research article Page: 20-39

Mechanical characterization of 3D-printed concrete elements reveals pronounced anisotropy due to interlayer interfaces, with compressive strength 12-22% lower than cast concrete when loaded perpendicular to layers, though similar in parallel orientations. Flexural and tensile strengths vary significantly by loading direction relative to print layers, dropping 32-40% when maximum stress aligns with weak interfaces, while shear strength and fracture energy reduce with longer interlayer times. Standardized tests—3-point bending, splitting tension, uniaxial compression, and punching shear—must account for geometric irregularities like voids and filament shape, using DIC for strain fields and capping for uniform loading. UHPC variants with fibers mitigate anisotropy, achieving 50-100 MPa compression and enhanced ductility, validated by LDPM simulations matching experimental failure modes. …… [For more click here]

Long-Term Deflection Prediction in Continuous Prestressed Concrete Girders

Marta Rey-López

Research article Page: 40-57

Long-term deflection prediction in continuous prestressed concrete girders accounts for time-dependent effects like creep, shrinkage, prestress relaxation, and traffic loading using advanced models such as B4 or modified CEB-FIP, calibrated against measured data. Step-by-step time integration methods, incorporating hygrothermal coupling and shear stiffness degradation from web cracking, improve accuracy over empirical approaches, capturing 8-35% additional deflections from environmental factors. For high-strength concrete (e.g., C55), short-term

strain measurements enable refined models that predict midspan deflections within 10% of observed values after 8 years, emphasizing humidity drops and cyclic loads. Continuous girders exhibit creep redistribution, reducing camber losses by 20-30% at interior supports compared to simply supported beams, validated in long-span rigid-frame bridges…… [For more click here].

Fluid-structure interaction in offshore platforms

Rik Van de Walle
Research article Page: 58-71

Fluid-structure interaction (FSI) in offshore platforms involves coupled simulations of hydrodynamic loads from waves, currents, and wind acting on flexible structures like floating platforms or jackets, using tools such as Ansys Aqwa for hydrodynamics and AQWA-NAUT for structural responses. One-way coupled FSI applies precomputed fluid pressures (e.g., via VOF CFD) to FEM models, while two-way coupling iteratively updates deformations affecting flow fields, critical for semisubmersible or tension-leg platforms under slamming or vortex-induced vibrations. SPH methods excel in capturing violent multiphase flows around deformable platforms, predicting surge, heave, and mooring tensions with validation against experimental data for DeepCwind models. These analyses ensure structural integrity by quantifying stress concentrations and fatigue from environmental loads, optimizing designs for harsh offshore conditions. …… [For more click here]

Landslide risk assessment and stabilization

Wesley De Nev, P. Díaz-Redondo & Amit Kumar
Research article Page: 72-89

Landslide risk assessment involves heuristic, statistical, probabilistic, and physically-based methods to map susceptibility, hazard, and vulnerability using factors like slope, geology, hydrology, land use, and rainfall triggers via GIS and remote sensing. Quantitative approaches such as logistic regression, AHP, and fuzzy logic classify zones (low to very high risk) with validation against historical inventories, while probabilistic models estimate temporal probabilities. Stabilization techniques prioritize drainage (surface/deep) to reduce pore pressure, followed by retaining structures (walls, anchors), soil nailing, vegetation, and buttress piles for mechanical reinforcement. Effective mitigation integrates monitoring (InSAR, inclinometers) with early warning systems for flood-prone or seismic areas, ensuring cost-effective resilience.…… [For more click here]

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

Katrin Wieneke, S. Shao & D. Carsten
Research article Page: 90-107

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]