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Editorial
Novel Technologies and Applications for Construction Materials

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In this volume, we discuss the recent progress in construction technologies and materials. The perspectives are to obtain new construction materials with improved properties at low cost by using easy and novel technologies and chemically sustainable for the environment. Different investigations are mentioned including those concretes strengthened with fiber reinforced polymers (FRP), either carbon or glass fibers, whose results show strength improvement and reduction of the cracks. Those called Engineered Cementitious Composites (ECC) reinforced with polypropylene (PP) are also discussed whose main purpose is to resolve earthquake consequences, as we know tremendous amount of seismic energy is released and structure is subjected to reverse loads. Such PP-ECCs materials can enhance strength and energy dissipation capacity. Moreover, The Ultra-Ductile Engineered Cementitious Composites (ECC) are applied as overlay in the repair of deteriorated concrete structures, significant improvements in load carrying capacity, and ductility over conventional concrete overlay are found. Also postfire behaviors of ECCs exposed at high temperature were discussed following different cooling regimes (quenching in water and cooling in air); the quenching in water has shown better mechanical properties than the cooling in air. Severe environmental conditions plus the relatively inferior frost resistance cause the deterioration of concrete and in consequence less durability. Nevertheless, usage of air entraining admixture can improve frost resistance and impermeability.

Also special concretes have been used widely in construction industry including infrastructure with special applications such as restoration and strengthening of existing structures against earthquake. Evaluation of the liquefaction potential of a liquefaction-prone area is important for geotechnical earthquake engineering, both for assessment for site selection and for planning and new constructions. By measuring different parameters as Standard Penetration Test (SPT) and the Shear Wave Velocity Test (VS) it is possible to obtain the liquefaction potential index (LPI). Studies on the effects of granular fill and geogrid reinforced granular fill on the behavior of the static liquefaction potential of the subsoil in the coastal area are reported. The experimental results revealed that the introduction of granular fill significantly increases the bearing capacity and effectively controls the settlement behavior of the footing.

The actual tendencies and global developments of novel materials include the use of recycled materials in construction. In polymer reinforced concrete the Young modulus of the cement matrix and polymers is responsible for the detrimental properties of the concrete, including compressive and tensile strength, as well as stiffness. For solving such problems a novel methodology is proposed by using waste tire particles and ionizing radiation, which have proven to be good tools for improvement of physical and chemical properties of concrete. Another investigation is related to the use of construction trash soils in the elaboration of resistant

masonry bricks of homogeneous and controlled density, as we know the expansive soils represent a problem for light buildings over them because of volumetric instability.

Different methods have been applied to relate applied forces and the subsequent modifications; for example, residual crack extension resistance curves are associated with cohesive force distribution on fictitious crack zone of complete fracture process. It was found that the residual fracture toughness increases with increasing crack length. Moreover, two new dimensional polynomial failure criteria have been proposed to predict the damage process of composite structures under loading. Four distinct failure modes including fiber tensile failure, fiber compressive failure, matrix tensile failure, and matrix compressive failure are considered. This can reduce the artificialness of choosing the criteria for the damage simulation of the failure modes. Moreover, multiscale methods for studying of the mechanical behavior of the interfaces are discussed.

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