Book reviews

Microstructure of cement based systems & Bonding and interfaces in cementitious materials

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The MRS proceedings consists of two parts, one dealing with the microstructure of cement-based systems and the other with bonding and interfaces in such systems. There is, however, a common theme in the two, as they both deal with the quantification of microstructures, either in the bulk or at the interfacial transition zone, and the relation between microstructural characteristics and overall physical and mechanical properties. The papers in both parts are of a high level, and present up-to-date information regarding techniques for quantification of microstructure and interfacial properties, as well as insight into the structure–property relations of advanced cementitious systems.

The papers in part I can be grouped into six categories: quantification of microstructure, porosity and cracks by image analysis; microstructural characteristics related to durability issues (delayed ettringite formation, alkali–silica reaction, sulphate attack, freeze–thaw); effect of admixtures and additives on microstructural characteristics and behaviour of cementitious systems; microstructural characteristics of special cementitious systems (high performance–low w/c ratio cements, high fly ash cements, calcium sulphoaluminate cement); microstructural issues related to the use of wastes in construction materials and containment of wastes; and electrical properties in relation to microstructure. Of particular interest is a paper on the evolution of cementitious materials through history, which provides the reader with the perspective of our achievements.

The papers in part II can be grouped into seven categories: interfaces between aggregates and cement paste–microstructure of the interfacial transition zone and its dependence on additives; modelling of the formation of the interfacial transition zone; quantification of the bond across this interface; fracture mechanics characterization of the interface and its influence on the fracture behaviour of concretes; effect of the interfacial transition zone on the bulk properties of concretes such as modulus of elasticity; transport properties across the interfacial transition zone (percolation, moisture permeability, leaching); the role of the interfacial transition zone in fibrous composites–characterization of interfacial microstructure in cements with different types of fibres, fibre–matrix bonding in such systems and its influence on the overall performance of composites.

The papers in this volume are well written and well presented. The information is new, with respect to both testing methods and properties of the cementitious systems. There is a wealth of knowledge here, which is highly valuable to those dealing with basic investigations and research aimed at developing advanced cementitious systems based on careful control of microstructure.

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