Book Reviews/*Buchbesprechungen*

Pore Structure of Cement–Based Materials
Testing, Interpretation and Requirements
by Kalliopi K. Aligizaki

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Compressive strength used to be and still is the decisive criterion for classifying different types of concrete. Although it has been recognised at an early stage that porosity has a strong influence on strength, interest in pore size distribution remained very limited until recently. Pore structure as it relates to the microstructural characteristic in a porous solid along with influencing the physical and mechanical properties also controls the durability of the material. By studying the interaction between the pore structure and the environment, the durability issues can be understood and attempts made to improve the same would be more effective. Durability and service life of reinforced concrete structures is important as the cost of maintaining and repairing an existing structure could become prohibitively expensive if not done in time and subsequently may not be possible within the limited financial resources deployed for such works in an emerging economy like ours. The initial idea of solving the durability problem by increasing the compressive strength of concrete was founded on wrong notions because subsequent investigations revealed that most deteriorating mechanisms are linked to migration of ions. Adsorption of water and salt solutions by capillary suction is one example of migration process which limits service life of concrete in many cases and which is controlled by porosity and pore size distribution.

Even though there have been numerous publications describing the various techniques used to determine pore structure in porous materials, there is not much compiled information on how these techniques apply on cement based materials and what are their limitations. New techniques are developing continuously with new applications, and new models and interpretations of results are introduced. The book under review focuses on the pore structure characterisation techniques that have been developed and are used extensively in concrete science.

Author Kalliopi K. Aligizaki who is a Research and Consulting Engineer at the Aedificat Institute Freiburg, Germany with a Ph.D. degree from The Pennsylvania State University, USA and whose research focus is on durability of building materials and parameters that affect reinforcement corrosion, has done a commendable job to collect the information from technical literature and organize the material in the form of a book of 383 pages having 9 chapters. The text is well illustrated with over 100 figures and 26 data tables.

For each technique presented an effort is made to describe its historical development, the theoretical principles and assumptions, the experimental procedure, the analysis of the results as they relate to the pore structure parameters and its limitations. The methods used most commonly to prepare specimens for microstructural and microscopical analysis are described in Chapter 2. Chapters 3-7 describe different techniques used to characterise the microstructure of hardened cement paste, including mercury intrusion porosimetry, gas adsorption, pycnometry, thermoporometry, nuclear magnetic resonance and small–angle scattering. Each technique is presented in a separate chapter in detail. The direct microscopical methods that have been developed through current sophisticated technology and applied to cement paste microstructure are described in Chapter 8, with emphasis given on stereology and characterisation of air voids. Chapter 9 provides comparison of results obtained by different techniques for pore structure parameters of interest.

Most of the experimental techniques used and the analysis procedures followed are the adaptations to cement pastes from other materials like catalysts or rocks. Some basic chemistry and physics background is required for the reader to understand the methods presented.

In recent years, the development of technology and widespread use of computers combined with sophisticated software have lead to significant advancements in the analysis of experimental results. Scientists have been continuously making efforts to analyse and explain new experimental findings with refined models that describe cement paste microstructure. In addition, as new techniques are developed, criticism and comparison with traditional techniques is inevitable. The available information has become so vast, that it becomes difficult at times to follow the developments, and be updated with new information. In