Book review

Aggregates in concrete

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This book is part 13 of the 'Modern Concrete Technology' series. Its eight chapters provide a comprehensive coverage of the geological origin of aggregates for concrete, production techniques and the characterisation of aggregate properties as well as examining the role of aggregates in fresh and hardened concrete. It is particularly focused on practice in South Africa, North America and the UK. Throughout the book there are references to South African, ASTM and British standards, but less so to the European standards that are gradually replacing British standards in the UK.

Following a useful introductory chapter, there is a description of the origin and classification of aggregates in terms of mineralogy and rock type. This chapter also covers methods of production.

Chapter 3 (the largest in the book) deals with the properties and characterisation of aggregates and includes detailed descriptions of a wide range of physical and chemical tests and advice on how to interpret the results. There is also a section on aggregate petrography.

Chapters 4 and 5 deal with the role of aggregates in plastic and hardened concrete respectively. With regard to plastic concrete, there is a particular emphasis on particle packing and concrete rheology.

The concept of the interfacial transition zone (ITZ) is introduced in chapter 5 alongside the more conventional examination of the effects of aggregate properties on the strength of hardened concrete.

The effect of aggregates on the durability and transport properties forms the subject for the next chapter. This book makes it clear that aggregates and the ITZ, as well as the cement paste, have a crucial role in producing durable concrete. This is a refreshing view-

point as, all too often, aggregates are erroneously considered merely as inert inclusions in the cement matrix, with no effect on processes such as carbonation and chloride ingress.

A lengthy discussion of alkali-silica reaction (asr) and different forms of sulfate attack are also included, detailing various methods for assessing the alkali reactivity of aggregates together with the effects of asr on the engineering properties of concrete.

Although the majority of the book is concerned with 'ordinary' aggregates used in conventional concrete, chapter 8 looks at 'special aggregates' and special concretes. This includes lightweight and high-density (heavyweight) aggregates as well as the more stringent requirements needed for ordinary aggregates to be used in specialist applications. There is discussion of the role of aggregates in high-strength and ultra-high-strength concrete, as well as self-compacting concrete and other applications. This chapter also includes some comments on the potential uses of marginal aggregates.

The final chapter is a listing of ASTM, British, Canadian and South African standards for aggregates and aggregate testing, accompanied by some notes on the application of standards and recent development of new standards. Perhaps a more accurate and descriptive title for this volume would have been 'The nature and performance of aggregates in concrete', a description to which the authors allude in the introduction. In summary, however, this book contains a comprehensive review of the subject matter with a good balance between theory and practice and with numerous references. It will be useful to both students and practising engineers alike.

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