

## Book review

### Understanding the Rheology of Concrete

N. Roussel (ed.). Woodhead Publishing, Cambridge, UK, 2012, ISBN 978-0-85709-028-7, **£140-00, 364 pp.**

Rheology's importance comes from the scope it offers for characterising fresh cement paste, mortar and concrete, and for understanding how they perform in practical applications. Without satisfactory fresh properties it is unlikely that the desirable properties of the hardened materials can be achieved.

*Understanding the Rheology of Concrete* provides a comprehensive and in-depth coverage of the science and technology of the rheology of fresh concrete from mix design to casting processes. The book was written by 14 individuals who are international experts in physics, chemistry and fluid mechanics disciplines. The book is structured in three parts, with 13 chapters. Part I (Chapters 1–5) begins with two introductory chapters, which deal with the rheology and rheometry of complex fluids, followed by another three chapters, which review current technology and testing methods for measuring the rheological properties of concrete and show how rheometry can be a valuable tool for the non-destructive study of the evolution of the structure of cement pastes from mixing to setting.

Part II (Chapters 6–9) present the main correlations that have been established between mix design and fresh properties. Topics in Chapter 6 include the discussion of the effects of particle properties on packing characteristics, models used to predict the packing density of a particle mixture, and effect of particle size distribution on rheology. The chemical classes of superplasticisers and their performance related to the rheology

of concrete are discussed in Chapter 7. The effects of viscosity-enhancing admixtures on the rheological properties and workability of cement-based materials are addressed in Chapter 8. The last chapter of part II describes the rheology of fibre concrete and discusses recent developments in the field of fibre rheology and the simulation of the flow of fibre suspensions.

Part III (Chapters 10–13) shows how the knowledge of fresh concrete properties can allow for the prediction of industrial casting processes. Chapters 10 and 11 describe the modelling of flow of self-compacting concrete and the rheological models for cement paste and concrete. Chapter 12 addresses the problem of formwork pressure. The pumping of conventional vibrated and self-compacting concrete is discussed in Chapter 13.

The main features of the book include self-contained chapters, each with an abstract and detailed references. The book is very readable. The majority of chapters in the book are written in the style of research article. The book provides useful information for the understanding of rheology and summarises key research on relevant topics. The book is an essential reference for scientists and engineers from both academia and civil engineering and construction industries interested in the properties of concrete. It will also benefit graduate and undergraduate students of civil engineering, materials and construction.

Professor Long-yuan Li