the properties of the concretes and some of the applications. These include their use for sewer pipes, architectural panels and for pavement repairs. One particularly useful paper is concerned with safety aspects of concrete polymer materials, as some of these organic materials are hazardous and must be used with considerable care.

The second major group of papers relates to polymer-impregnated concrete. This technique has been much more widely used in the USA than in the UK, where the incorporation of polymers in concrete as one of the mix ingredients is more common. Again the papers deal either with the properties of the material or with the applications of the system in practice. One paper is of particular interest, that by Fukuchi and Ohama, who describe a technique for the manufacture of a polymer impregnated, auto-claved concrete that has a compressive strength in excess of 220 N/mm². The applications relate primarily to repair work, the most demanding application being to the repair of cavitation damage at the

Dworshak Dam in the USA. The use of polymer-impregnation is very promising for, despite the technical difficulties and the high cost, the surface that is established appears to be standing up to the eroding action of the waters in the spill-ways very well. The other remedial work relates primarily to frost-damaged pavements and bridge decks.

Finally there are papers on sulphur-impregnated concrete, which is particularly relevant to the USA and Canada where stockpiles of sulphur reached unacceptably high levels. This work is less relevant to the UK.

This publication provides a useful collection of papers, particularly on polymer concrete and polymer-impregnated concrete and is a most welcome addition to the ACI series of Special Publications. The answer to the question posed in the opening paragraph is thus yes; this is a book that could justifiably be purchased by those interested in polymer concretes, despite the fact that further publications are already available.

C. D. POMEROY

Developments in concrete technology – 1

Edited by F. D. Lydon

London, Applied Science Publishers Ltd, 1979. Type-set, illustrated, cloth-bound. 230 × 145 mm. pp. x, 325. ISBN 0 85334 855 3. Price: £23.50.

This book is essentially a collection of review articles on various aspects of concrete technology. The editor, F. D. Lydon, has chosen seven subjects which have been the subject of significant recent research and invited contributions from recognized experts. The resulting book is not for those who want simple answers to simple questions, but rather will appeal to the reader who wishes to know not only the present state of the art but also the areas where controversy and uncertainty still exist.

Chapter 1, by P. J. E. Sullivan, is entitled *THE EFFECTS OF TEMPERATURE ON CONCRETE*. The text is not quite as comprehensive as the title might suggest and deals only with temperatures above room temperature. The effects of freezing and cryogenic temperatures are not covered. However, within this limitation, it contains considerable data showing how temperatures up to 800°C affect strength, elastic modulus, thermal properties and creep.

Chapter 2, by J. M. Illston, deals with *TIME-DEPENDENT DEFORMATIONS OF CONCRETE*. The deformations considered are drying shrinkage and creep, and the effects of mix and external variables are discussed in detail. Also included are charts to enable designers to estimate the magnitude of time-dependent deformations.

Chapter 3, by K. D. Raithby, is entitled *BEHAVIOUR OF CONCRETE UNDER FATIGUE LOADING*. The title accurately describes the content, which concentrates mainly on work carried out at the Transport and Road Research Laboratory.

Chapter 4, by R. D. Browne and A. F. Baker, *THE PERFORMANCE OF STRUCTURAL CONCRETE IN A MARINE ENVIRONMENT*, is perhaps the most practically orientated review and discusses in general terms the factors which affect the durability of concrete (both plain and reinforced) under marine conditions. As would be expected, with such a widely encompassing title, the discussion is necessarily less detailed than is achieved by other contributors to this book.

Chapter 5, deals with *CONCRETE UNDER COMPLEX STRESS* and is written by J. B. Newman. It deals first with the problems of testing techniques and proceeds to describe the stress-strain behaviour of concrete specimens under various biaxial and triaxial states of stress.

Chapter 6 is written by R. Narayan Swamy and is entitled *FRACTURE MECHANICS APPLIED TO CONCRETE*. This chapter is a comprehensive literature review of the extensive and often controversial attempts to apply fracture mechanics to concrete. It is probably of little use to the practical designer, but is essential

reading for anyone wishing to acquaint himself with the current research position on this subject.

Chapter 7 by N. Clayton and F. J. Grimer is entitled THE DIPHASE CONCEPT WITH PARTICULAR REFERENCE TO CONCRETE. It attempts to convince the reader that concrete is not held together by internal bonding, but rather by an external pressure exerted by a quasi-atmosphere. The arguments, although interesting,

are largely esoteric and somehow this first chapter does not fit in with the rest of the book. It would probably be more appropriate as a paper in a scientific journal.

Viewed as a whole, *Developments in concrete technology* is an informative collection of comprehensive review papers and as such constitutes a useful work of reference on the subjects covered.

D. D. HIGGINS