Book review

HYDRAULICS OF SPILLWAYS AND ENERGY DISSIPATION

R. M. Khatsuria. Marcel Dekker, 2004. ISBN 0-8247-5789-0, \$199.99, 680 pp.

In preparing this volume Mr Khatsuria has clearly drawn on a lifetime of practical experience in his role as Additional Director of the Central Water and Power Research Station, Pune, India, from which he retired in 2001.

Many textbooks on this subject focus on the design of 'standard' stilling basins, roller buckets and ogee crests, which resulted from the extensive model testing carried out in the USA in the 1950s and 1960s. These often appear as US Bureau of Reclamation (USBR) or Waterways Experiment Station (WES) monographs. Mr Khatsuria has built on this to update us with a summary of all the international work that has been carried out more recently on many other topics such as stepped spillways, siphons and fuse-gates. For those who have not supplemented their textbooks over the years with copies of American Society of Civil Engineers, Institution of Civil Engineers and International Commission on Large Dams papers and articles from specialist trade journals and magazines, here is one volume which seems to cover them all in well thought out and prepared chapters. There are some occasional typographic errors, but they are minor and do not detract from the valuable information contained.

The book is divided into four sections. The first deals with spillways, the second with energy dissipaters, the third is on cavitation and air entrainment and the fourth on hydraulic modelling. The first two sections are the most extensive with 18 separate chapters on spillways and seven on energy dissipaters.

The first section, on spillways, starts by overviewing the broad philosophy of choosing and sizing appropriate spillways, including the estimation and selection of the design flood. This is followed by specific chapters on ogee crests, side channels, stepped spillways, siphons, shaft spillways, labyrinths, tunnel spillways, free jets and unlined rock spillways. Basic theory is presented in each case followed by practical design examples and, where appropriate, examples of operating histories. The same section also includes other chapters on spillways for sediment disposal, fuse gates and inflatable rubber weirs as well as a useful

and practical summary of spillway crest gate selection and design. All the chapters are fully referenced and as up-to-date as possible for a book published in 2004. For example, in the case of stepped spillways, half the references date from 2000 or later.

The section on energy dissipaters includes the usual USBR stilling basin and roller bucket designs but also introduces the reader to other options such as the Gandolfo-Cotta split bucket from Argentina and the Bhavani basin from India. Both of these have credible operating histories. The author does record examples of operational problems with the latter, but to put this into context there have been a number of problems with 'standard' USBR-type basins and these are discussed in dedicated sub-sections on uplift, hydrodynamic forces, cavitation, vibration and abrasion. Even environmental considerations have their own dedicated sub-section, all typical of the holistic approach to the subject adopted by Mr Khatsuria and which also distinguishes him from many other authors on the topic. The section on energy dissipaters also provides useful updates on free jet overfalls, crest splitters, downstream impact basins and plunge pools.

The sections on cavitation and air entrainment and on hydraulic modelling, by their nature, deal with specific, specialist issues and are therefore much shorter than the other two sections. In reality they comprise three chapters: one on cavitation, one on air entrainment and one on hydraulic modelling. However, in dealing with these, Mr Khatsuria brings his customary thoroughness to the topics covering both the histories of the issues concerned as well as bringing us as up-to-date as possible. In each case he also provides much practical information so that the chapters do not simply represent theoretical treatises on the issues, but would rather give an engineer some confidence that he could use the information provided as a basis for preparing preliminary and practical designs.

To summarise, this book would be a useful addition to the library of any practitioner involved in the design or operation and maintenance of spillways and energy dissipaters. Mr Khatsuria is to be congratulated on producing such a well thought out and thorough work and for making his extensive experience available for the use and benefit of others.

P. J. MASON