SHORTER NOTICES

A Mathematical Treatise on Vibrations in Railway Bridges. By C. E. Inglis. Cambridge, University Press, and New York, Macmillan, 1934. 203 pp. and 65 figures.

Professor Inglis has written a book which, notwithstanding its particular application to vibrations in railway bridges, should prove a valuable asset to both the mathematician and engineer interested in the general subject of vibration theory. For his treatment the author has used the method of harmonic analysis throughout, a method not only powerful, but particularly suited for handling vibrations in structures due to complicated distributions of moving loads. The rapid convergence of the series involved in the analysis permits many useful approximations which are in excellent agreement with the unwieldy, exact formulas.

In the introductory chapter the reader is acquainted with the principles involved in the methods to be used. There is also interesting reading on the behavior of railway bridges subject to moving loads. The first two chapters serve to illustrate the method of harmonic analysis by applications to beams subject to various end restraints and vibrating under various types of periodic forces. In the following eight chapters the principles are applied to railway bridges, each chapter treating the problem more generally than the previous one, and finally culminating in a study of the complex modes of vibration arising when locomotive spring movement is included in the general picture. The vector method for finding particular solutions of the linear differential equations involved is next demonstrated. This graphical method, extremely useful and capable of easy application, is rather infrequently used by the mechanical engineer, although it is quite familiar to most electrical engineers. Short-span bridges of 50 feet or less are treated in a separate chapter, and locomotive and bridge characteristics are fully discussed. In the final chapter the author determines the dynamic bending moments and shearing forces due to the vibrations, pointing out the important differences which result if the usual method of differentiating the curve of bending the proper number of times is employed for this calculation.

Although many complex problems are treated exactly in the book, practically every case is also considered approximately and clearly demonstrated with typical numerical examples.

The descriptive matter is written in an interesting manner and the text is sufficiently illustrated. The practising engineer will find extremely useful a synopsis at the very end of the book in which the most important results are collected and re-stated.

The reviewer recommends this book highly both to the student of vibrations interested in the mathematical analysis peculiar to structures vibrating under various types of moving loads and to the engineer interested in railway bridge design.

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