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BOOK REVIEW

Fourier Series and Integrals, by H. Dym and H. P. McKean. Probability and Mathematical Statistics No. 14, Academic Press, New York and London, 1972. $18.50.

Harmonic analysis has had more than its share of fine books. Starting with Fourier's great essay *Théorie Analytique de la Chaleur* ("the bible of the mathematical physicist," according to Arnold Sommerfeld), the list is surprisingly, almost embarrassingly, long. In addition to such basic books as Wiener's groundbreaking *The Fourier Integral and Certain of Its Applications* and Zygmund's fundamental treatise *Trigonometrical Series*, there have been volumes like Loomis' *Abstract Harmonic Analysis* and Rudin's *Fourier Analysis on Groups* which, by popularizing and developing new ideas, have exerted an important influence on research and the creation of new mathematics. More recently, we have seen the publication of Edwards' two-volume *Fourier Series* and Katznelson's exceptionally fine text *Introduction to Harmonic Analysis*. And, among the more specialized monographs, one must mention, in addition to Salem's lovely little *Algebraic Numbers and Fourier Analysis*, *Ensembles Parfaits et Séries Trigonométriques* by Kahane-Salem and Kahane's two volumes, *Some Random Series of Functions* and *Séries de Fourier Absolument Convergentes*. Lists, like comparisons, are invidious: ours could be lengthened at will.

What has been missing up to now is a text, intelligible to a fairly broad mathematical public, which explains just what Fourier analysis is all about; which makes explicit the connections with probability and number theory, elliptic functions and differential equations, electrical engineering and information theory and quantum mechanics; which puts it all together. Now Harry Dym and Henry McKean have written that book.

It is a subject for wonder that it was not written earlier. Certainly, the current appeal of harmonic analysis is very great. Recent brilliant advances in the subject (most notably, the work of Malliavin, Carleson, Varopoulos, Fefferman, and others) together with the rich amalgamation of techniques and ideas and the foudroyant elegance of the results combine to give the subject an almost irresistible attraction. Yet most of this work has dealt with the fine analysis of functions: problems of pointwise convergence, spectral synthesis, and thin sets, surely the very sort of thing the talmudic sage must have had in mind when he consigned mathematics to the "periphery of wisdom." Important as these developments are from the point of view of the researcher, their emphasis has obscured for most, if not all, mathematics students the vital connections harmonic analysis has with other branches of mathematics and science.