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BULLETIN (New Series) OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 16, Number 2, April 1987

0273-0979/87 $1.00 + $.25 per page

Eigenvalues in Riemannian geometry, by Isaac Chavel, with a chapter by Burton Randol and an appendix by Jozef Dodziuk, Academic Press, Inc. (Harcourt Brace Jovanovich, Publishers), Orlando, San Diego, New York, London, Toronto, Montreal, Sydney, Tokyo, 1984, xiv + 362 pp., $62.00. ISBN 0-12-170640-0

The recent explosion of activity studying the relation between geometric and analytic properties of spaces has fused many areas of mathematics, such as the traditionally disparate fields differential geometry, partial differential equations, topology, mathematical physics, and number theory. One of the most popular topics in this study is the search for properties of the spectrum of the Laplace operator of a manifold in terms of its geometric invariants. Until recent decades there have been few significant developments, owing to the need for expertise in many fields. Eigenvalue problems are directly related to many geometric problems as well as to the disciplines mentioned above. Moreover, the techniques that have been developed in studying the Laplacian and its spectrum are equally important as the theorems about eigenvalues. This versatility factor coupled with the recent undeniable success of geometric analysis is responsible for the sudden blossoming of this classical area of mathematics.

The most fundamental object of study is the Laplace-Beltrami operator. Being invariantly defined, it is the simplest geometric elliptic operator which appears everywhere in geometry. It is the principal part of the expression for scalar curvature of a conformal factor in a metric as well as the mean curvature and stability form of a hypersurface. More importantly it is the linearization of the many nonlinear operators in geometry such as the Gauss curvature operator, the mean curvature operator and the Monge-Ampère operator. It is