Those who wonder why such a knowledgeable author has suddenly appeared with no previous record of publications will find that he is a relative of N. Bourbaki, if they inquire in the right circles.

REFERENCES

1. Ralph Abraham and Jerrold Marsden, *Foundations of mechanics*, 2nd ed., Benjamin Cummings, Reading, Mass., 1978.

2. V. I. Arnol'd, *Mathematical methods of classical mechanics*, Graduate Texts in Math., vol. 60, Springer-Verlag, New York, 1978.

3. N. Bourbaki, *Éléments de mathèmatique*, Fasc. 24 Livre II, Chapitre 9, *Formes sesquilineares et formes quadratiques*, Hermann, Paris, 1969.

4. S. S. Chern, *From triangles to manifolds*, Amer. Math. Monthly **86** (1979), 339–349.

5. Ian N. Sneddon, *Reivew of* [**2**, **7**], Bull. Amer. Math. Soc. (N.S.) **2** (1980), 346–352.

6. Shlomo Sternberg, *Review of* [**1**], Bull. Amer. Math. Soc. (N.S.) **2** (1980), 378–387.

7. W. Thiring, *Classical dynamical systems*, Springer-Verlag, New York, 1978.

8. A. Weinstein, *On the volume of manifolds all of whose geodesics are closed*, J. Differential Geom. **9** (1974), 513–517.

RICHARD L. BISHOP

BULLETIN (New Series) OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 11, Number 2, October 1984

0273-0979/84 $1.00 + $.25 per page

Percolation theory for mathematicians, by Harry Kesten, Progress in Probability and Statistics, vol. 2, Birkhauser, Boston, Mass., 1982, 423 pp., $30.00. ISBN 3-7643-3107-0

Physicists have enthusiastically embraced percolation models, and a dramatic explosion of physics literature on percolation has occurrred in recent years. This literature is rich in simulations, conjectures, heuristic methods, and a wide variety of applications and variations of the basic models. Mathematicians who experience frustration in tracing the thread of fact through this tangle of conjecture and empirical evidence will appreciate the mathematical rigor in *Percolation theory for mathematicians*.

Percolation models originated in discussions between Broadbent and Hammersley (1957) on the excluded volume problem in polymer chemistry and the design of coal miners' masks. Such topics suggested a probabilistic model for fluid flow in a medium with randomness associated with the medium rather than the fluid. Hence, percolation theory arose as an alternative to the more familiar diffusion models, in which randomness is associated with the fluid.

Models. In a percolation model, the medium is represented by a graph G, which is usually an infinite graph with some regularity of structure. Familiar examples are the square, triangular, and hexagonal lattices in two dimensions, and the cubic lattice in three dimensions. The fluid flow is determined by a random network of vertices and edges in the graph.

The random mechanism may be associated with either the vertices or the edges, so two standard models arise: In the *bond* percolation model, each edge is "occupied" by fluid with probability p and " vacant" with probability $1 - p$,