the theory of rays and associated variational principles. Rays are uniquely valuable in the asymptotic investigation of both linear and nonlinear waves.

It is therefore natural on opening a book on Asymptotic Wave Theory to enquire what aspects of rays are covered. The reader will seek in vain, for there is not a single mention of ray. He will find the Laplace transform, Bessel functions and the method of steepest descent for integrals described and then applied to various problems in water waves and seismology. But the nearest he will get to a ray is in one short section on characteristics. The absence of one of the most powerful modern tools for evaluating the asymptotic performance in many different physical contexts is a serious deficiency in a book purporting to deal with asymptotic theory. Whatever other methods are eliminated in the process of selection this one must not be discarded. The applied mathematician of today dare not be ignorant of rays which can offer a viable approach both analytically and numerically when other techniques are hopeless. The book at his elbow and the book he shows his students need to tell the reader about the propagation of energy along rays, transport equations and Hamilton's principle. Without these topics the value of a book is that much less. Caveat emptor.

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Stochastic processes in queueing theory, by A. A. Borovkov, Applications of Mathematics, no. 4, Springer-Verlag, New York, Heidelberg, Berlin, 1976, xi + 280 pp., $29.80.

Queueing theory is that branch of applied mathematics which attempts to construct and analyse models for what might be called 'unpredictable congestion'. There are many practical situations in which 'customers' demand some sort of 'service' which they cannot immediately obtain because of the demands of other customers. Very often the congestion is caused by variability, in the arrival pattern of the customers, or in the service mechanism, or both, and any model must be expressed in terms of random processes, and can be expected to yield conclusions in probabilistic language.

The early development of the theory was motivated by the problems of congestion in telephone systems, first in Scandinavia (A. K. Erlang) and later in the United States and France (F. Pollaczek). At first it grew in isolation from other manifestations of applied probability, but gradually the connections with the growing theory of random processes came to be realised and exploited. In the West this process may be said to have been completed in 1951 when D. G. Kendall addressed a famous meeting of the Royal Statistical Society, but in Russia the work of A. Ya. Hincin had by then already introduced the subject to the thriving Russian school of probabilists.

It must be admitted that the last quarter-century has been more notable for quantity than for quality of published research. It is too easy to devise a slightly different queueing system and to study it by what are now standard methods. If one's results can be kept safely under cover of several Laplace transforms, they are safe from comparison with reality. And indeed, those