General Relativity and Gravitation, Vol. 31, No. 1, 1999

Editor's Note: The External Field of a Radiating Star in General Relativity. The Gravitational Field of a Radiating Star. "Newtonian" Time in General Relativity.

by P. C. Vaidya

Current Science **12, 183 (1943).**
Proceedings of the Indian Academy of Sciences **A 33, 264 (1951).**
Nature **vol. 171, no 4345, 260 (1953).**

The three papers reprinted in this issue *have* made their due impact on later research, and their results are now relatively well-known (even though few textbooks mention them). The "Vaidya's radiating star metric" derived in them is today commonly used for two purposes:

(i) As a testing ground for various formulations of the cosmic censorship hypothesis.

(ii) As an exterior solution for models of objects consisting of heat-conducting matter.

Still, it is always worthwhile to go back to the original source, especially when the presentation is of such excellent pedagogical quality as in the second paper. The three papers present consecutive stages of the derivation of the result; it became well-known in the form presented in the third paper.

Many other solutions with the same type of source are known today (see Ref. 1; the source is a null fluid for which the energy-momentum tensor has the form $T_{\mu\nu} = \rho k_\mu k_\nu$, k_μ being a null vector field). For more on physical interpretation of such an energy-momentum tensor see [2] and [3].

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Also, several solutions in which the source is a mixture of a perfect fluid and null radiation have been obtained in later years; most of them by P. C. Vaidya and coworkers (see Chap. 5 in Ref. 4). The solutions presented in [5] and [6] are somewhat similar to the one presented here: the latter is interpreted as a zone of radiation travelling throught empty space, the former are interpreted as a zone of radiation travelling through a Robertson–Walker Universe.

The physical and geometrical interpretation of Vaidya's solution was discussed at length in [7].

— *Andrzej Krasiński, Associate Editor*

Acknowledgements. The editor is grateful to N. K. Dadhich for his help in contacting the publisher of the first and the second paper.

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Brief biography

Prahalad Chunilal Vaidya was born on March 23, 1918 at Shapoor in Gujarat, India. He got his M.Sc. degree from the University of Bombay in 1940 and Ph.D. in 1949.

He worked as Lecturer in Mathematics at various colleges from 1943 to 1959 and as Professor of Mathematics at Gujarat University, Ahmedabad from 1959 to 1971. After a stint as Chairman of Gujarat Public Service

Commission for 6 years, he returned to Gujarat University as its Vice-Chancellor and retired from there in 1980.

Research Work: He was in Benaras for training in research in GRG under Professor V. V. Narlikar during July 1942–April 1943. There, under the guidance of Professor Narlikar, he obtained an exact solution of Einstein's equations during the gravitational field of a radiating star. He studied the geometry of null curves in a rotating background in order to work out the gravitational field of a rotating and radiating star which led him and his collaborator L. K. Patel to derive the Radiating Kerr metric. Vaidya has also studied radiating and rotating distributions in cosmological background.

— *P. C. Vaidya*