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GENERALIZATIONS OF NAKAYAMA RING V

(LEFT SERIAL RINGS WITH (*, 2))

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We have studied a left serial algebra over an algebraically closed field with $(*, n)$ as right modules in [4] and further investigated an artinian left serial ring R with $(*, 1)$ in [7], when eJ/eJ^2 is square-free for each primitive idempotent e, where J is the Jacobson radical of R. On the other hand, we have given a characterization of a certain artinian ring with $(*, 3)$ in [6].

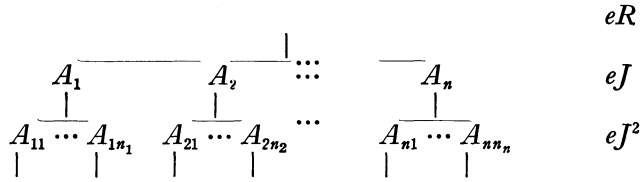
For a left serial ring R, we shall obtain, in the second section of this paper, a characterization of R with $(*, 1)$ (Theorem 1), and one of R with $(*, 2)$ (Theorem 2) in the third section. We shall study hereditary rings with $(*, 2)$ in the forthcoming paper.

In order to give a complete study of a left serial ring with $(*, 1)$, we need deep properties of a division ring (much more difficult than Artin problem, see (♯)).

We shall use the same terminologies given in [7] and every ring R is a both-sided artinian ring with identity, unless otherwise stated.

1. Left serial rings

In this section, we assume that R is a left serial ring. Then $eJ^i=\sum_k \oplus A_k$, where the A_k are hollow right R-modules by [8], Corollary 4.2. We shall describe this situation as the following diagram:



or