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Phase-type distributions and risk processes with state-dependent premiums. (English)

Zbl 0876.62089
Scand. Actuarial J. 1996, No. 1, 19-36 (1996).

Summary: Consider a risk reserve process with initial reserve u, Poisson arrivals, premium rule $p(r)$ depending on the current reserve r and claim size distribution which is phase-type in the sense of *M. F. Neuts* [see "Matrix-geometric solutions in stochastic models. An algorithmic approach" (1981; Zbl 0469.60002)]. It is shown that the ruin probabilities $\psi(u)$ can be expressed as the solution of a finite set of differential equations, and similar results are obtained for the case where the process evolves in a Markovian environment (e.g., a numerical example of a stochastic interest rate is presented). Further, an explicit formula for $\psi(u)$ is presented for the case where $p(r)$ is a two-step function. By duality, the results apply also to the stationary distribution of storage processes with the same input and release rate $p(r)$ at content r.

MSC:

62P05	Applications of statistics to actuarial sciences and financial mathematics
91B30	Risk theory, insurance (MSC2010)
62M99	Inference from stochastic processes

Keywords:

ruin probability; differential equations; phase-type distributions; random environment; numerical methods; risk reserve process

Full Text: DOI

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