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A direct approach to a first-passage problem with applications in risk theory. (English)

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The authors consider a reflected version of the classical surplus process used in ruin theory. This process constitutes a resonable attempt to model the surplus of companies with steady outflows and sporadic inflows (e. g. discoveries, patents). Pharmaceutical or petroleum companies are prime examples of such companies. For this type of process, a risk management policy is implemented to reduce the expense rate if no inflow is generated within an Erlang-n time period. To define the surplus process of interest, the authors introduce a Markovian representation. A homogeneous linear integro-differential equation for the Laplace transform of the time to ruin is derived. Boundary conditions of this equation are used to complete the Laplace transform representation. Numerical applications are presented to show that the considered budget reduction policy can be an effective risk management tool.

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MSC:

91B30 Risk theory, insurance (MSC2010)
60K15 Markov renewal processes, semi-Markov processes
60K20 Applications of Markov renewal processes (reliability, queueing networks, etc.)
60K37 Processes in random environments
60J75 Jump processes (MSC2010)

Keywords:

dual ruin model; first-passage time; Laplace transform; risk management; ruin problem

Full Text: DOI

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