

# **Branching Processes With Incubation**

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## **Summary**

We consider a model of a branching stochastic process that takes into account the incubation period of the life of individuals. We demonstrate that such processes may be treated as a two-type age-dependent branching process with a periodic mean matrix. Based on this we derive the extinction probability and the asymptotic behavior of the mean number of individuals, when the Malthusian parameter exists. Exact formulas for the expected extinction time and for the distribution of the number of generations to extinction will be obtained. Possible applications in determining the optimal vaccination rate in epidemics will also be discussed.

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