Contact process with renewal cures

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The contact process is a model for the spread of an infection in which subjects lying on the sites of a graph may be infected, reinfected and transmit the infection to/by their neighbors, and also get healed. Most literature treats the case where for each subject the healing as well as the infection mechanism, independent from other subjects, is memoryless. In a number of recent studies, we analyse the case where the healing takes place according to a general renewal process, thus going beyond the traditional exponential memoryless case in this aspect of the model; the infection mechanism is kept memoryless, at rate lambda, which is a parameter of the model. An issue of interest is the triviality of the critical parameter λ_c, above which the infection started with a single infected subject survives indefinitely with positive probability, and below which we have almost sure extinction of that infection. The tail of the renewal distribution plays a key role. If that tail is too heavy, we have $\lambda_c = 0$; otherwise, $\lambda_c > 0$. Roughly, heavy tail means an infinite first moment, but we require precise conditions on our analysis, nuancing this issue. We will present our results for various particular cases, drawing up the above sketched picture; and characterizing the asymptotic behavior of the model when $\lambda_c = 0$ (under more or less restrictive regularity conditions on the tail of the renewal distribution).

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