

Spreading dynamics of forget-remember mechanism

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We study extensively the forget-remember mechanism (FRM) for message spreading, originally introduced in *Eur. Phys. J. B* **62**, 247 (2008). The freedom of specifying forget-remember functions governing the FRM can enrich the spreading dynamics to a very large extent. The master equation is derived for describing the FRM dynamics. By applying the mean field techniques, we have shown how the steady states can be reached under certain conditions, which agrees well with the Monte Carlo simulations. The distributions of forget and remember times can be explicitly given when the forget-remember functions take linear or exponential forms, which might shed some light on understanding the temporal nature of diseases like flu. For time-dependent FRM there is an epidemic threshold related to the FRM parameters. We have proven that the mean field critical transmissibility for the SIS model and the critical transmissibility for the SIR model are the lower and the upper bounds of the critical transmissibility for the FRM model, respectively.

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