



Iranian Journal of Physics Research, Vol. 21, No. 3, 2021

## Interaction of two diseases spreading with different dynamics SIR and SIS

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(Received 14 April 2021 ; in final form 01 June 2021)

### Abstract

Interaction between two diseases can be as competition and cooperation. In this work, we study these interactions for two diseases that spread simultaneously on a multiplex network. We assume that each disease spreads in one layer of the network with a different structure than the other layer. We consider an asymmetric case in which one disease propagates according to the SIR dynamics, and another one follows the dynamics of the SIS model. By using the heterogeneous mean-field theory, we find the epidemic threshold of each disease in the case of cooperation and competition. We also obtain the phase diagram of the model that contains information about the prevalence of diseases.

**Keywords:** multilayer networks, spreading processes, epidemic threshold, mean field approximation, phase transition

For full article, refer to the Persian section