

NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING  
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*Fokker-Planck Equation Method for Predicting Viral Signal  
Propagation in Social Networks*

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**Abstract:** We consider the modeling and computations of random dynamical processes of viral signals propagating over time in social networks. The viral signals of interests can be popular tweets on trendy topics in social media, or computer malware on the Internet, or infectious diseases spreading between human or animal hosts. The viral signal propagations can be modeled as diffusion processes with various dynamical properties on graphs or networks, which are essentially different from the classical diffusions carried out in continuous spaces. We address a critical computational problem in predicting influences of such signal propagations, and develop a discrete Fokker-Planck equation method to solve this problem in an efficient and effective manner. We show that the solution can be integrated to search for the optimal source node set that maximizes the influences in any prescribed time period. This is a joint work with Profs. Shui-Nee Chow (GT-MATH), Hongyuan Zha (GT-CSE), and Haomin Zhou (GT-MATH).

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