NOVEL PERCOLATION MODELS IN COMPLEX NETWORKS

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Statistical physics approaches have been developed and applied successfully in recent years to understand the topology, robustness and function of complex networks. We will show how ideas from percolation theory lead to novel types of percolation which lead to better understanding of the structure and improve their function. We will show how the k-core percolation can yield information about the centrality of nodes in complex systems including the Internet and business firm networks. We will discuss a percolation model that includes path length restrictions (Limited Path Percolation (LPP)) which are relevant for information flow and epidemics. Another percolation process (Equal Graph Partitioning (EGP)) is characterized by fragmenting the network into equal size clusters which result in removing or immunizing the minimal number of nodes, will be also discussed. This result is useful for developing efficient immunization strategies.

Keywords
networks, percolation, centrality, LPP, EGP

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