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Robustness and dynamics of networks of coupled modules JAMES BAGROW, YONG-YEOL AHN, Northeastern University, SUNE LEHMANN, Technical University of Denmark — Many systems, from power grids and the internet, to the brain and society, can be modeled using networks of coupled overlapping modules. The elements of these networks perform individual and collective tasks such as generating and consuming electrical load or transmitting data. We study the robustness of these systems using percolation theory: a random fraction of the elements fail which may cause the network to lose global connectivity. We show that the modules themselves can become isolated or uncoupled (non-overlapping) well before the network falls apart. This has important structural and dynamical consequences for these networks and may explain how missing information hides pervasive overlap between communities in real networks.

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