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Heterogeneity in community structure and renormalization in scale-free networks BYUNGNAM KAHNG, JIN KIM, DOOCHUL KIM, Seoul National University — While many real-world networks contain community structures within them, their structural feature has not been fully understood yet. Here we study heterogeneities of community structures such as their sizes, cohesiveness, modularity, and renormalized degree, finding that there exist nontrivial power-law relationships between them, based on real-world networks. We show that such obtained relationships provide the condition of scale invariance of the degree distribution under renormalization. Also we show that the load or betweenness centrality of communities depends on such structural properties of communities.

Byungnam Kahng
Seoul National University

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