

The Edge Cover Reliability Polynomial of a Graph

Michael Yatauro, Penn State–Brandywine, USA

Let G be a finite simple graph. Assume edges are selected independently with probability ρ , for $0 < \rho < 1$. The *edge reliability polynomial* of G , denoted $R(G, \rho)$, is the polynomial in ρ which calculates the probability that a randomly selected set of edges in G forms an edge cover of G . If \mathcal{G} is a class of graphs, we say $H \in \mathcal{G}$ is *uniformly most (resp. least) reliable* if $R(H, \rho) \geq R(G, \rho)$ (resp. $R(H, \rho) \leq R(G, \rho)$) for all $G \in \mathcal{G}$ and for all ρ . We will discuss the edge reliability polynomials of trees, unicyclic graphs, and graphs having one more edge than the number of vertices. In particular, we provide a survey of results which demonstrate the uniformly most/least reliable graphs within these three classes.

Keywords: unicyclic graph, edge cover, reliability polynomial, uniform optimality