STEVENS Institute of Technology

Arthur E. Imperatore School of Sciences and Arts

Department of Mathematical Sciences

Seminar

Louis Petingi

Computer Science Department
College of Staten Island
City University of New York

On the characterization of the source-to-all-terminal diameter-constrained reliability domination

Friday, August 29, 2003
3:00 pm
Lieb Bldg, 3rd Floor Conference Room

Abstract: Let $G = (V, E)$ be a digraph with a distinguished set of terminal vertices $K \subseteq V$ and a vertex $s \in K$. We define the s, K-diameter of G as the maximum distance between s and any of vertices of K. If the arcs fail randomly and independently with known probabilities (vertices are always operational), the Diameter-constrained s, K-terminal reliability of G, $R_{s,K}(G, D)$, is defined as the probability that surviving arcs span a subgraph whose s, K-diameter does not exceed D.

A graph invariant called the domination of a graph G was introduced by Satyanarayana and Prabhakar to generate the non-canceling terms of the classical reliability expression, $R_{s,K}(G)$, based on the same reliability model (i.e. arcs fail randomly and independently and where nodes are perfect), and defined as the probability that the surviving arcs span a subgraph of G with unconstrained finite s, K-diameter. This result allowed the generation of rapid algorithms for the computation of $R_{s,K}(G)$.

In this paper we present a characterization of the diameter-constrained s, K-terminal reliability domination of a digraph $G = (V, E)$ with terminal set $K = V$, and for any diameter bound D, and, as a result, we solve the classical reliability domination, as a specific case. Moreover we also present a rapid algorithm for the evaluation of $R_{s,V}(G, D)$.