• 系統編號	RB8906-0050
• 計畫中文名稱	機率性流量網路的可靠度分析與最佳化探討之研究
• 計畫英文名稱	Studies on Reliability Analysis and Optimization for Probabilistic Flow Networks
• 主管機關	行政院國家科學委員會
• 計畫編號	NSC83-0415-E007-078
• 執行機構	國立清華大學工業工程研究所
• 本期期間	8208 ~ 8307
• 報告頁數	0 頁
• 使用語言	英文
• 研究人員	阮約翰 Yuan, John
• 中文關鍵字	流量網路；最佳化；可靠度分析
• 英文關鍵字	Flow network；Optimization；Reliability analysis
• 中文摘要	查無中文摘要
• 英文摘要	Reliability is an important indicator in planning, designing and operating any network system. However, many real-world systems such as electric power transmission and distribution systems, transportation systems, manufacturing systems, and etc. which play important roles in our daily lives can be regarded as probabilistic flow networks whose arcs have discrete and multi-valued random capacities. Such a flow network is indeed a multistate system with multistate components and so its source-to-terminal reliability for a system demand level d, i.e. the probability that the maximal flow from a specified source node s to a specified terminal node t is no less than the demand d, can be computed in terms of minimal path vectors to level d [6] (named d-MPs here) or minimal cut vectors to level d [6] (named d-MCs here). Hence, the problem on how to search for all of its d-MPs or d-MCs efficiently arises. In this project, we will mainly concentrate on such flow networks and then study on how: i) to present a simple algorithm to generate all d-MPs and d-MCs respectively for such a flow network from s to t first so that the source-to-terminal reliability for each system demand level d can then be computed in terms of them, ii) to extend the results in (i) to the multiple terminals case so that the source-to-K-terminal reliability of such a flow network can be obtained, and (iii) to present two indices of component importance to the system so as to provide the decision maker with sufficient information to improve the system. After all d-MPs or d-MCs having been obtained, three methods such as inclusion-exclusion method, disjoint subset method and state space decomposition method are then applied to evaluate/approximate the source-to-terminal reliability for each system demand level d in terms of such d-MPs or d-MCs. Several examples are considered to illustrate each of such three methods. In addition, these results are extended so that two simple and efficient algorithms are developed to evaluate the reliability

of such a flow network from s to k specific terminals. Several examples are considered to illustrate such a proposed method. Finally, two indices of component importance are also presented so as to provide the decision maker with sufficient information to maintain or improve the system.