

# 一種用於同調與非同調系統的網路可靠度演算法則 A New Algorithm For Calculating the Network Reliability of the Coherent and Non-coherent System

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## Abstract

This paper presents a new algorithm for calculating the reliability of the binary coherent and non-coherent network system. It depends on Boolean function algorithm and Shannon's expansion form. Following the input terms by SDP form, we will get the Boolean function of the fewest SDP terms by choosing adequate variable  $X_i$  or  $\bar{X}_i$ . While all the algorithms published to date, only apply for coherent system, the algorithm of this paper applies for not only coherent system but also non-coherent system. We also designed a program to proceed this algorithm. Finally, we listed ten examples. First to fifth examples are binary coherent system, in which we compared both SDP terms obtained by the algorithm of this paper and that of SLR. Last five examples are binary non-coherent systems, we found in which its fewest SDP terms and reliability.

## 摘要

本文提出一種適用於二進位同調系統與非同調系統的網路可靠度演算法則，依照布林函數演算法則和向農展開式。將輸入路徑集表示成不相交的形式，經過特別的選取  $X_i$  或  $\bar{X}_i$  變數即可得到最少 SDP 項數的布林函數，目前文獻所提出的演算法則只適用於同調系統，而本文所提出的演算法同時適用於同調和非同調系統，並已設計一套程式來計算可靠度的大小，最後舉出十個例子，前五個為二進位同調系統，比較本文的演算法則和 SLR 演算法則的 SDP 項數，後五個為二進位非同調系統，求其最少項數的 SDP 形式與可靠度。