论文

通信网络宏观可靠性指标的全代数化算法

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摘要
为了更全面和客观地评价宽带大容量通信网络的可靠性能, 引入宏观可靠性指标--总容量归一化加权可靠性指标概念, 它是把通信容量和链路可靠性参数有机地综合在一起的指标. 解决该指标全代数化计算的关键问题是寻找能够算出网络各节点之间全部路由的代数化路由算法. 研究出一种逻辑代数化网络路由算法, n个节点的网络只需n次矩阵变换运算, 就能得到任意节点之间的全部路由. 基于新路由算法研究出网络可靠性指标的全代数化算法, 它易于编写程序, 利用计算机可以很方便地算出通信网络的可靠性指标, 解决了总容量归一化加权可靠性指标计算困难问题, 且达到实用化程度. 利用算例验证了算法的正确性, 并对算法的各计算过程进行了详细说明.

关键词　通信网　可靠性　路由算法　通信容量

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A Complete Algebraic Algorithm of Macroscopic Reliability Index of a Communication Network

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Abstract
A concept of weighted reliability index normalized by the total capacity called index of macroscopic reliability is introduced in this paper to evaluate reliability of broadband network comprehensively and objectively. This index combines communication capacity with link reliability parameter effectively. The key technique to achieve complete algebraic calculation of this index is finding out an algebraic algorithm which can calculate all routes among network nodes. This paper proposes a new algebraic calculation routing algorithm, by which n times transformation operations can get all routes between two nodes for network with n nodes. The complete algebraic calculation of network reliability index is researched base on this new routing algorithm, it is easy to program and convenient to calculate reliability index of telecommunication network with computer. This method overcomes the difficulties in calculating normalized reliability index weighted by total capacity and can be used in practice. The calculation procedure of the algorithm is shown through examples in details and its correctness is validated.

Key words　Communication network　Reliability　Route algorithm　Communication capacity

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