The Study of Fault Tolerance for Hamiltonicity of Node Expansion on Hypercue

張烜瀚、洪春男

E-mail: 9707315@mail.dyu.edu.tw

ABSTRACT

In this thesis, we construct the variant of hypercube X(Qn, {xb, xw}) with node expansion on one black node xb and one white node xw of hypercube Qn = (Vb ∪ Vw, E). We investigate the fault tolerance for multi-spanning disjoint paths of complete graph Kn. Let F ?} (V∪E) be a faulty set on complete graph Kn. We prove Kn − F is Hamiltonian connected for F ?T n − 4. Secondly, we show that there exist m spanning disjoint paths in Kn − F for F ?T n − 2 and 1 ?T m ?T ?(n-|F|)/2?. We thus prove that for any m pairs of fault-free vertices in Kn − F, there exist m spanning disjoint paths of Kn − F for F ?T n − 5 and 2 ?T m ?T ?(n-|F|)/2?. Let F = Fb ∪ Fw ∪ F ’ be the faulty set of X(Qn, {xb, xw}) where Fb (?} Vb), Fw (?} Vw) and F ’ are disjoint sets. We show that X(Qn, {xb, xw}) − F is Hamiltonian if one of the following condition holds. (1).|Fb| = |Fw| = 0, |F ’ | ?T n − 2, (2).0 < |Fb| = |Fw| ?T ?n/4?-1, |F ’ | ?T n − 1 − 4|Fb|, (3).0 ?T |Fw| ≠ |Fb| ?T ?n/4?-2, |F ’ | ?T n − 3 − 4fmax, for fmax = max{|Fb|, |Fw|}. We thus derive that X(Qn, {xb, xw}) is k-Hamiltonian for k = ?n/4?-2. We furthermore show that X(Qn, {xb, xw}) is k-Hamiltonian connected for k ?T ?(n-2)/4?-2.

Keywords : Hypercube ; Node expansion ; Spanning disjoint path

Table of Contents

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