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Embedding meshes and TORUS networks onto degree-four chordal rings

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Abstract

Degree-four chordal rings demonstrate many attractive properties, such as node symmetry, constant degree, $O(\sqrt{N})$ diameter and the ability to interconnect an arbitrary number of nodes. The authors study the abilities of degree-four chordal rings to execute parallel programs using graph-embedding techniques. Since many algorithms have been designed for meshes and TORUS networks, the issue of embedding meshes and TORUS networks onto degree-four chordal rings is addressed. Mapping functions, simple and snake-like, of embedding meshes and TORUS networks onto the degree-four chordal rings is discussed in detail. It is shown that the ILLIAC network is a special class of the degree-four chordal ring. Topological properties are investigated, such as diameter and average distance of ILLIAC networks and optimal degree-four chordal rings, another special class of degree-four chordal rings. Comparisons of ILLIAC networks and optimal chordal rings in these embedding issues are given.

Key words：Degree-four chordal rings; Embedding; Illiac networks; Torus networks