

### 处理器可靠性约束的电压频率岛NoC能耗优化

张剑贤<sup>①</sup> 周端<sup>②</sup> 杨银堂<sup>①</sup> 赖睿<sup>①</sup> 高翔<sup>①\*</sup>

<sup>①</sup>(西安电子科技大学微电子研究所 西安 710071) <sup>②</sup>(西安电子科技大学计算机学院 西安 710071)

## Energy Optimization of NoC Based on Voltage-frequency Islands under Processor Reliability Constraints

Zhang Jian-xian<sup>①</sup> Zhou Duan<sup>②</sup> Yang Yin-tang<sup>①</sup> Lai Rui<sup>①</sup> Gao Xiang<sup>①\*</sup>

<sup>①</sup>(Institute of Microelectronics, Xidian University, Xi'an 710071, China)

<sup>②</sup>(School of Computer Science and Technology, Xidian University, Xi'an 710071, China)

摘要

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**摘要** 该文针对支持电压频率岛的NoC能耗优化问题,提出了基于电压频率岛划分、分配以及任务映射的能耗优化方法。该方法通过基于处理器可靠性约束的电压频率岛划分,降低了处理器能耗;利用近凸区域选择的电压频率岛分配策略,减少了不同电压岛间复杂路由器的个数;借助量子粒子群算法优化了NoC映射,降低了系统的通信能耗。实验结果表明,该文算法在满足NoC处理器可靠性要求的前提下,可显著降低NoC系统能耗。

**关键词:** 片上网络 电压频率岛 可靠性 映射 量子粒子群

**Abstract:** A method for energy optimization based on the partitioning, assignment, and task mapping of voltage-frequency islands is proposed, considering the issue of energy optimization of Network-on-Chip (NoC) that supports voltage-frequency islands. The energy consumption of the processor is reduced by the partitioning of voltage-frequency islands under processor reliability constraints; the number of complex routers between different voltage-frequency islands is decreased by the voltage-frequency islands assignment strategy of near convex region selection; and the energy consumption of system communications is reduced through NoC mapping optimizations by quantum-behaved particle swarm algorithm. Experimental results show that the presented algorithm can significantly reduce the NoC system energy consumption with the requirements of NoC processor reliability satisfied.

**Keywords:** Network-on-Chip (NoC) Voltage-Frequency Islands (VFIs) Reliability Mapping Quantum-behaved Particle Swarm(QPS)

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**通讯作者:** 张剑贤 Email: jianxianzhang@mail.xidian.edu.cn

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