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S³PR网的一种死锁预防策略

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摘要 针对S³PR网的死锁预防问题，提出了一个有效的死锁预防控制算法，将用于死锁避免的C/D-RUN控制策略扩展到基于信标的死锁预防策略中，合理分配控制库所的资源，从而保证不存在死锁的状态和步骤. 首先将S³PR网中的严格极小信标分为基本信标和从属信标，由基本信标集合得出一组状态向量表示的线性不等式约束，然后将这组约束用C/D-RUN策略进行优化，得到一组标识向量满足的广义相互抑制约束. 根据所得标识约束添加控制库所，使所有基本信标均为P-不变式可控，得到活的、结构简单的、许可行为更多的Petri网监督控制器.

关键词 柔性制造系统 死锁预防 Petri网 基本信标 S^3PR

分类号 TP278

Deadlock prevention policy for a class of petri nets S³PR

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Abstract

To solve the problem of deadlock prevention for a class of Petri nets, S³PR, an effective deadlock prevention policy is proposed. The deadlock avoidance policy of Conjunctive / Disjunctive Resources Upstream Neighborhood (C / D-RUN) is applied to the siphon-based deadlock prevention policy, and the resources of the control places are allocated reasonably to guarantee the absence of deadlock states and processes. First, strict minimal siphons of an S³PR are divided into elementary and dependent ones. From the set of elementary siphons, a set of linear inequality constraints expressed by the state vector can be formalized, and after being modified by the C / D-RUN policy, a set of generalized mutual exclusion constraints(GMEC) expressed by the marking vector can be found. Then monitors based on the marking constraints are added to the plant model to ensure that all elementary siphons in the S³PR net are invariant-controlled, thus leading to a deadlock freedom liveness-enforcing supervisor with a simple structure and much permissive behavior can be realized.

Key words flexible manufacturing system deadlock prevention Petri net elementary siphon S^3PR

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