论文与报告

离散时间间接型模型参考自适应控制的一种系统化的分析方法

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摘要
This paper presents the design and analysis of indirect model reference adaptive control (MRAC) with normalized adaptive law for a class of discrete-time systems. The main work includes three parts. Firstly, the constructed plant parameter estimation algorithm not only possesses the same properties as those of traditional estimation algorithms but also avoids the possibility of division by zero. Secondly, by finding the relationship between the plant parameter estimate and controller parameter estimate and using the properties of plant parameter estimate, the similar properties of controller parameter estimate are also established. Thirdly, based on the relationship properties between the normalizing signal and all the signals in the closed-loop system and on some important mathematical tools on discrete-time systems, as in the continuous-time case, a systematic stability and convergence analysis approach to the discrete indirect MRAC scheme is developed rigorously.

关键词　 Discrete-time systems　 indirect　 model reference adaptive control (MRAC)　 normalized adaptive law

分类号

A Systematic Analysis Approach to Discrete-time Indirect Model Reference Adaptive Control

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Abstract
This paper presents the design and analysis of indirect model reference adaptive control (MRAC) with normalized adaptive law for a class of discrete-time systems. The main work includes three parts. Firstly, the constructed plant parameter estimation algorithm not only possesses the same properties as those of traditional estimation algorithms but also avoids the possibility of division by zero. Secondly, by finding the relationship between the plant parameter estimate and controller parameter estimate and using the properties of plant parameter estimate, the similar properties of controller parameter estimate are also established. Thirdly, based on the relationship properties between the normalizing signal and all the signals in the closed-loop system and on some important mathematical tools on discrete-time systems, as in the continuous-time case, a systematic stability and convergence analysis approach to the discrete indirect MRAC scheme is developed rigorously.

Key words　 Discrete-time systems　 indirect　 model reference adaptive control (MRAC)　 normalized adaptive law

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