Power control for CDMA cellular radio systems via l1 optimal predictor

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Abstract

In direct-sequence code division multiple access (DS-CDMA) cellular radio systems, power control is an important means to achieve higher communication link quality and larger system capacity. In order to track a desired signal-to-interference-plus-noise ratio (SINR) under round-trip delay, multiple access interference (MAI), channel fading, and noise, a robust state feedback control via a desired pole (eigenvalue) placement and an l1 optimal prediction is proposed for power control of CDMA systems. The l1 predictor is used to predict the tracking error to compensate for the effect of round-trip delay, such that the peak of prediction error due to the uncertainties of channel fading, interference, and noise is as small as possible. Then the optimal l1 predictor design problem is transformed to a suboptimal prediction problem by minimizing the upper bound of the l1 norm of SINR tracking error and solving the eigenvalue problem (EVP) under some linear matrix inequality (LMI) constraints. Under the proposed framework, the global information of the channel gains of all users in the CDMA system is not required.

Keyword：Closed-loop power control, DS-CDMA, l1 prediction control, LMI