



Iasson Karafyllis, Miroslav Krstic

Predictor Feedback for Delay Systems: Implementations and Approximations

Series: Systems & Control: Foundations & Applications

- **First book to study the implementation issues of predictor feedback and provide formulas for the uncertainty gains of time-delay systems with large input and/or measurement delays**
- **All results, along with the necessary assumptions, are clearly stated as theorems, corollaries, or lemmas immediately followed by a very concise proof**
- **Material is presented in a well-organized and accessible manner despite the inherent complexity of the topic**

This monograph bridges the gap between the nonlinear predictor as a concept and as a practical tool, presenting a complete theory of the application of predictor feedback to time-invariant, uncertain systems with constant input delays and/or measurement delays. It supplies several methods for generating the necessary real-time solutions to the systems' nonlinear differential equations, which the authors refer to as approximate predictors. Predictor feedback for linear time-invariant (LTI) systems is presented in Part I to provide a solid foundation on the necessary concepts, as LTI systems pose fewer technical difficulties than nonlinear systems. Part II extends all of the concepts to nonlinear time-invariant systems. Finally, Part III explores extensions of predictor feedback to systems described by integral delay equations and to discrete-time systems. The book's core is the design of control and observer algorithms with which global stabilization, guaranteed in the previous literature with idealized (but non-implementable) predictors, is preserved with approximate predictors developed in the book.

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