

Classical control using H_∞; methods: theory, optimization, and design

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Abstrak

This versatile book teaches control system design using H_∞ techniques that are simple and compatible with classical control, yet powerful enough to quickly allow the solution of physically meaningful problems. The authors begin by teaching how to formulate control system design problems as mathematical optimization problems and then discuss the theory and numerics for these optimization problems. Their approach is simple and direct, and since the book is modular, the parts on theory can be read independently of the design parts and vice versa, allowing readers to enjoy the book on many levels. The development of H_∞ engineering was one of the main accomplishments of control in the 1980s. However, until now, there has not been a publication suitable for teaching the topic at the undergraduate level. This book fills that gap by teaching control system design using H_∞ techniques at a level within reach of the typical engineering and mathematics student. It also contains a readable account of recent developments and mathematical connections.

The authors treat control design problems in a physically correct way. They present a small set of specific rules that the reader can apply to convert a particular design problem to the fundamental optimization problem of H_∞ control. This precisely formulated mathematics problem can then be solved on a computer. The book introduces the control software package OPTDesign, which allows the reader to easily reproduce the calculations done in the solved examples and even try variations on them. The description of how to convert an engineering problem to a form suitable for CAD is simpler than in other books.