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Weighted H^∞ Mixed-Sensitivity Minimization for Stable Distributed Parameter Plants Under Sampled Data Control.

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Abstract: This paper considers the problem of designing near-optimal finite-dimensional controllers for stable multiple-input multiple-output (MIMO) distributed parameter plants under sampled-data control. A weighted $\mathcal{H}^\infty$-style mixed-sensitivity measure which penalizes the control is used to define the notion of optimality. Controllers are generated by solving a "natural" finite-dimensional sampled-data optimization. *A priori* computable conditions are given on the approximants such that the resulting finite-dimensional controllers stabilize the sampled-data controlled distributed parameter plant and are near-optimal. The proof relies on the fact that the control input is appropriately penalized in the optimization. This technique also assumes and exploits the fact that the plant can be approximated uniformly by finite-dimensional systems. Moreover, it is shown how the optimal performance may be estimated to any desired degree of accuracy by solving a single finite-dimensional problem using a suitable finite-dimensional approximant. The constructions given are simple. Finally, it should be noted that no infinite-dimensional spectral factorizations are required. In short, the paper provides a straight forward control design approach for a large class of MIMO distributed parameter systems under sampled-data control.

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