Worst-Case Robust Multiuser Transmit Beamforming Using Semidefinite Relaxation: Duality and Implications

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This paper studies a downlink multiuser transmit beamforming design under spherical channel uncertainties, using a worst-case robust formulation. This robust design problem is nonconvex. Recently, a convex approximation formulation based on semidefinite relaxation (SDR) has been proposed to handle the problem. Curiously, simulation results have consistently indicated that SDR can attain the global optimum of the robust design problem. This paper intends to provide some theoretical insights into this important empirical finding. Our main result is a dual representation of the SDR formulation, which reveals an interesting linkage to a different robust design problem, and the possibility of SDR optimality.

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