

# MIMO PID Tuning via Iterated LMI Restriction

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We formulate multi-input multi-output (MIMO) proportional-integral-derivative (PID) controller design as an optimization problem that involves nonconvex quadratic matrix inequalities. We propose a simple method that replaces the nonconvex matrix inequalities with a linear matrix inequality (LMI) restriction, and iterates to convergence. This method can be interpreted as a matrix extension of the convex-concave procedure, or as a particular majorization-minimization (MM) method. Convergence to a local minimum can be guaranteed. While we do not know that the resulting controller is globally optimal, the method works well in practice, and provides a simple automated method for tuning MIMO PID controllers. The method is readily extended in many ways, for example to the design of more complex, structured controllers.