# Perturbation theory of the Moore-Penrose inverse and the least squares problem

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The Moore-Penrose pseudo-inverse of an arbitrary matrix has many applications in numerical computation, statistics, control systems, curve fitting, and differential algebraic equations [5]. It is particularly useful in dealing with linear least squares problems $\min_x \|b-Ax\|_2$, see [1, 4], and very recently the error analysis of some highly accurate numerical algorithms presented in [3] for structured least square problems has been based on new perturbation expressions and bounds for the variation of the Moore-Penrose inverse. In this talk we first discuss some existing results for the additive and multiplicative perturbation of the Moore-Penrose pseudo-inverse [2] and, second, we extend the perturbation results that we introduced in [3] to obtain new perturbation bounds using unitarily invariant norms and Q-norms that improve significantly previous bounds available in the literature. We will comment on future research on accurate solutions of non-negative constrained least squares problems.

## References

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