

HOW TO SOLVE HIGHLY SENSITIVE PROBLEMS: A GEOMETRIC PERSPECTIVE

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Abstract:

Arising frequently in sciences and engineering, there is a class of problems whose solutions are highly sensitive to data perturbations. Finding accurate solutions to those “ill-posed problems” remains a formidable challenge in numerical computation due to inherent rounding errors.

For many of those problems, however, the hyper-sensitivity may be a misconception, as argued by numerical analysts. To understand why the solutions are sensitive, we present a geometric explanation by investigating the differential manifolds formed by those problems and their stratification structure.

The geometry of the ill-posedness leads a “three-strikes” principle for reformulation of the problems and a two-staged strategy for solving those problems.

ALL FACULTY, STUDENTS AND STAFF ARE WELCOME