Multiple-Precision Arithmetic on MATLAB for reliable computation of numerically unstable problems

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In this talk we introduce multiple-precision arithmetic environment on MATLAB for the sake of accurate and reliable computation of numerically unstable problems. Most of inverse problems are ill-posed in the sense of Hadamard, and it causes rapid growth of rounding errors in their numerical treatments. Conventionally the double precision arithmetic which has 16 decimal digits accuracy is used in scientific numerical computations, and it is not enough for numerically unstable processes. To reduce rounding errors, we develop fast multiple-precision arithmetic environment with user-friendly interface for MATLAB on Linux, Windows, and MacOSX. Some demonstrations are shown in the presentation.