

Centro de Investigação em Matemática e Aplicações
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Gaussian elimination for linear systems with
imprecisions*

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Abstract The coefficients and right-hand member in a linear system of equations often are imprecise, coming from measurements or estimations. We model the imprecisions asymptotically, assuming that they are small with respect to the measured value. We do not use Oh's and oh's, which may be considered as groups of bounded functions, but use nonstandard analysis, which allows for actual infinitesimals within the set of real numbers. The imprecisions are then modelled by *scalar neutrices*, which are convex groups of numbers.

Due to the algebraic properties of neutrices, it is possible to extend the method of Gaussian elimination to linear systems with imprecisions. We permute the equations and the variables such that the imprecisions in the right-hand member are increasing from above to below, and combine this with the *LU*-approach of numerical analysis.

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