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Validated Numerics - a short introduction to rigorous computations

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Abstract:

We will present an efficient means of performing numerical computations with rigorous error bounds. The basic idea is to use set-valued mathematics as the underlying framework. This enables us to change focus from approximating the solution to enclosing the same. These ideas have been known since the 1950:s, but it is only since quite recently that modern programming languages have allowed for the efficient implementation of such frameworks. The applications range from computer-assisted proofs in pure mathematics to more applied areas such as parameter estimation problems.