Very-high-precision solutions of a class of Schrödinger equations

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We introduce and investigate a method to solve a class of Schrödinger equation eigenvalue problems numerically to ridiculously high precision – like tens to hundred of thousands of digits $D$. The memory requirement, and the number of high precision algebraic operations, of the method scales essentially linearly with $D$ when only the eigenvalue is computed. However, since the (Schönhagen-Strassen) algorithm for multiplying high precisions number scales like $D \log D \log \log D$ the time requirement of the method increases slightly faster than $D^3$.

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