New approach to folding with the Coulomb wave function

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Due to the long-range character of the Coulomb interaction theoretical description of low-energy nuclear reactions with charged particles still remains a formidable task. One way of dealing with the problem in an integral-equation approach is to employ a screened Coulomb potential. A general approach without screening requires folding of kernels of the integral equations with the Coulomb wave. A new method of folding a function with the Coulomb partial waves is presented. The partial-wave Coulomb function both in the configuration and momentum representations is written in the form of separable series. Each term of the series is represented as a product of a factor depending only on the Coulomb parameter and a function depending on the spatial variable in the configuration space and the momentum variable if the momentum representation is used. Using a trial function, the method is demonstrated to be efficient and reliable.