Method of summation of some slowly convergent series

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Abstract

A new method of summation of slowly convergent series is proposed. It may be successfully applied to the summation of generalized and basic hypergeometric series, as well as some classical orthogonal polynomial series expansions. In some special cases, our algorithm is equivalent to Wynn's epsilon algorithm, Weniger transformation (Computer Physics Reports 10 (1989) 189-371) or the technique recently introduced by Čížek, Zamastil and Skála (Journal of Mathematical Physics 44 (3) (2003) 962-968). In the case of trigonometric series, our method is very similar to the Homeier's $\mathscr{H}$ transformation, while in the case of orthogonal series — to the $\mathscr{K}$ transformation. Two iterated methods related to the proposed method are considered. Some theoretical results and several illustrative numerical examples are given.

Key words: Convergence acceleration, Extrapolation, Levin-type method, Nonlinear sequence transformation, Iterative methods, Power series, Orthogonal series, Hypergeometric series, Basic hypergeometric series
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