SHANKS' TRANSFORMATIONS, ANDERSON ACCELERATION, AND APPLICATIONS TO SYSTEMS OF EQUATIONS

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In computational sciences it is often necessary to obtain the limit of a sequence of objects of a vector space that converges slowly to its limit or even diverges. It is possible, in some situations, to modify the method that produces the original sequence. However, in many instances, the process by which the sequence is produced is hidden into a black box or too cumbersome for this approach to be practical.

Thus, a solution is to transform this sequence, by means of a sequence transformation, into a new sequence which, under some assumptions, converges faster. Among these techniques Shanks' transformation is arguably the best all-purpose method for accelerating convergence of sequences.

The aim of this talk is to present a general framework for Shanks' transformation(s) of sequences, which. includes the Minimal Polynomial Extrapolation (MPE), the Reduced Rank Extrapolation (RRE), the Modified Minimal Polynomial Extrapolation (MMPE), the Topological Shanks transformation (TEA and STEA algorithm), and also Anderson Acceleration (AA).

Applications to the solution of systems of equations will be discussed.

References

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