

Gauss quadrature and look-ahead Lanczos algorithm

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Abstract

Gauss quadrature can be generalized to approximate arbitrary linear functional on the space of sufficiently smooth functions. Any Gauss quadrature can be constructed by the (look-ahead) Lanczos algorithm. On the other hand, the (look-ahead) Lanczos algorithm computes the Gauss quadrature for a particular linear functional. Therefore we can say that the (look-ahead) Lanczos algorithm is a matrix formulation of the Gauss quadrature. Consequently, the main results about incurable breakdown of the Lanczos algorithm can be proved by means of the Gauss quadrature.