

Abstract Submitted  
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**A General, Simple, Blackbox Algorithm for the Evaluation of the Exponential of a Matrix**<sup>1</sup> CHARLES WEATHERFORD, DANIEL GEBREMEDHIN, XINGJUN ZHANG, Florida A&M University — The evaluation of a matrix exponential function is a classic problem of computational linear algebra. Many different methods have been employed for its numerical evaluation [Moler C and van Loan C 1978 *SIAM Review* **20** 4], none of which produce a definitive algorithm which is broadly applicable and sufficiently accurate, as well as being reasonably fast. Herein, we employ a method which evaluates a matrix exponential as the solution to a first-order initial value problem in a pseudo-time variable. The new aspect of the present implementation of this method is to use finite elements in the pseudo-time variable. [Weatherford C A, Red E, and Wynn A 2002 *Journal of Molecular Structure* **592** 47] Then using an expansion in a properly chosen pseudo-time basis, we are able to make accurate calculations of the exponential of any given matrix as the solution to a set of simultaneous equations, even when the matrix is singular or rectangular.

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