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Fidele F Ngwane* (ngwanef@mailbox.sc.edu), 807 Hampton street, walterboro, SC 29488, and **Samuel N Jator** (jators@apsu.edu), Department of mathematics, Austin Peay State University, Clarksville, TN 37044. *Integrating oscillatory Hamiltonian systems via a block algorithm with an automatic error estimate based on a trigonometrically-fitted second derivative extended backward differentiation formula.*

We derived a trigonometrically-fitted continuous second derivative extended backward differentiation formula whose coefficients are functions of the frequency and the step size. The continuous form is used to construct a trigonometrically-fitted block second derivative extended backward differentiation formula (TBSDEBDF) for numerically integrating oscillatory Hamiltonian systems in a block-by-block approach and the Hamiltonian function is shown to conserve energy. The convergence and stability properties of the TBSDEBDF are discussed and numerical examples are presented to illustrate the accuracy of the method. In the case where the analytic solution is not available, we use error estimates to show the accuracy of the method. (Received August 25, 2016)