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Error characterization for asynchronous computations: Proxy equation approach GABRIELLA SALLAI, Franklin and Marshall College, ANKITA MITTAL, SHARATH GIRIMAJI, Texas AM Univ — Numerical techniques for asynchronous fluid flow simulations are currently under development to enable efficient utilization of massively parallel computers. These numerical approaches attempt to accurately solve time evolution of transport equations using spatial information at different time levels. The truncation error of asynchronous methods can be divided into two parts: delay dependent (E_A) or asynchronous error and delay independent (E_S) or synchronous error. The focus of this study is a specific asynchronous error mitigation technique called proxy-equation approach. The aim of this study is to examine these errors as a function of the characteristic wavelength of the solution. Mitigation of asynchronous effects requires that the asynchronous error be smaller than synchronous truncation error. For a simple convection-diffusion equation, proxy-equation error analysis identifies critical initial wave-number, λ_c. At smaller wave numbers, synchronous error are larger than asynchronous errors. We examine various approaches to increase the value of λ_c in order to improve the range of applicability of proxy-equation approach.

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