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Numerical ansatz for solving integro-differential equations with increasingly smooth memory kernels MICHAEL ZWOLAK, California Institute of Technology — We present an efficient and stable numerical ansatz for solving a class of integro-differential equations. We define the class as integro-differential equations with increasingly smooth memory kernels. The resulting algorithm reduces the computational cost from the usual T^2 to T*C(T), where T is the total simulation time and C(T) is some function. For instance, C(T) is equal to ln T for polynomially decaying memory kernels. Due to the common occurrence of increasingly smooth memory kernels in physical, chemical, and biological systems, the algorithm can be applied to quite a wide variety of situations. We demonstrate the performance of the algorithm by examining two cases. First, we compare the algorithm to a typical numerical procedure for a simple integro-differential equation. Second, we solve the NIBA equations for the spin-boson model in real time. Work supported in part by NSF and Sigma Xi. See also, cond-mat/0611412

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