

Toward Efficient Solvers for RTHS: Convolution Integral for High-Order (Mostly) Linear Numerical Models

Erik A. Johnson¹, Steven F. Wojtkiewicz² and Richard E. Christenson³

¹ Sonny Astani Department of Civil & Environmental Engineering, University of Southern California, Los Angeles, CA

² Department of Civil & Environmental Engineering, Clarkson University, Potsdam, NY

³ Civil & Environmental Engineering Department, University of Connecticut, Storrs, CT

A primary challenge in applying real-time hybrid simulation (RTHS) for realistic specimens is the complexity of the numerical model of the portion of the system that is simulated. Faster simulation hardware connected to the RTHS system can facilitate more advanced numerical modeling; even so, the level of detailed modeling that can be easily done for many structures can still challenge the capabilities of a RTHS system to achieve “hard real time” integration of the corresponding equations of motion. For some numerical models, those that are primarily linear and deterministic, this presentation highlights an approach for converting this system, even if of millions of degrees of freedom, into a low-order Volterra integral equation that can be evaluated much faster than the original system. An explanation of the approach is given along with a brief summary of a couple applications that the authors have studied.

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