Electronic Transactions on Numerical Analysis.
Volume 16, pp. 50-69, 2003.

ISSN 1068-9613.

ETNA
Kent State University
etna@mcs.kent.edu

GENERAL THEOREMS FOR NUMERICAL APPROXIMATION OF STOCHASTIC PROCESSES ON THE HILBERT SPACE $H_2([0,T],\mu,\mathbb{R}^d)$*

HENRI SCHURZ†

Abstract. General theorems for the numerical approximation on the separable Hilbert space $H_2([0,T],\mu,\mathbb{R}^d)$ of cadlag, $(\mathcal{F}_t)$-adapted stochastic processes with μ-integrable second moments is presented for nonrandom intervals $[0,T]$ and positive measure μ. The use of the theorems is illustrated by the special case of systems of ordinary stochastic differential equations (SDEs) and their numerical approximation given by the drift-implicit Euler method under one-sided Lipschitz-type conditions.

Key words. stochastic-numerical approximation, stochastic Lax-Theorem, ordinary stochastic differential equations, numerical methods, drift-implicit Euler methods, balanced implicit methods.

AMS subject classifications. 65C20, 65C30, 65C50, 60H10, 37H10, 34F05.

*Received March 12, 2002. Accepted for publication January 31, 2003. Recommended by Richard Varga.
† Department of Mathematics, Southern Illinois University, Mailcode 4408, Carbondale, IL 62901, USA. E-mail: hschurz@math.siu.edu. This work was supported by University of Minnesota and Southern Illinois University.