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Nathan Glatt-Holtz, Roger Temam and Chuntian Wang* (wang211@umail.iu.edu),
Rawles Hall, 831 East 3rd St, Bloomington, IN 47405. *Numerical Analysis of the Stochastic Navier-Stokes Equations: Stability and Convergence of Invariant Measures.*

When studying turbulence of the fluids, many outstanding problems are concerned with the long-term behaviors. This motivates us to design schemes that justify the long-term simulations of chaotic and complex systems. Working towards this final goal, in this article, we propose a class of space-time discretization numerical schemes that preserve certain statistical features for the stochastic Navier-Stokes equations (NSE) subject to a nonlinear state dependent white noise forcing. We first demonstrate the stability criteria and convergence of schemes. Then we establish existence and convergence of an invariant measure for each step of the schemes to the ergodic measure of the limit system, provided that the associated semigroup of the limit system has a strict contraction property. It is also verified that this is the case in many meaningful settings of the stochastic NSE. (Received February 17, 2015)