

CENTRAL LIMIT THEOREM FOR A GAUSSIAN INCOMPRESSIBLE  
FLOW WITH ADDITIONAL BROWNIAN NOISE

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*Abstract:* We generalize the result of Komorowski and Papanicolaou published in [7]. We consider the solution of stochastic differential equation

$$dX(t) = V(t, X(t))dt + \sqrt{2\kappa}dB(t),$$

where  $B(t)$  is a standard  $d$ -dimensional Brownian motion and  $V(t, x)$ ,  $(t, x) \in \mathbb{R} \times \mathbb{R}^d$ , is a  $d$ -dimensional, incompressible, stationary, random Gaussian field decorrelating in finite time. We prove that the weak limit as  $\epsilon \downarrow 0$  of the family of rescaled processes  $X_\epsilon(t) = \epsilon X(t/\epsilon^2)$  exists and may be identified as a certain Brownian motion.

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**Key words and phrases:** Weak convergence, random process, Gaussian field, incompressible flow, diffusion.

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