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Arnaud Debussche : Stochastic primitive equations with transport noise and weak hydrostatic assumption

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We investigate the convergence of solutions of a stochastic 3D Navier-Stokes equations to those of the primitive equations. We explore the impact of relaxing the hydrostatic assumption in the stochastic primitive equations by retaining martingale terms as deviations from hydrostatic equilibrium. This modified model, obtained through a specific asymptotic scaling accessible only within the stochastic framework, captures non-hydrostatic effects while remaining within the primitive equations formalism. We prove that it provides a higher-order approximation of the 3D stochastic Navier-Stokes equations.