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Chapter 1 : Reactive-Diffusive-Advective Traveling Waves in a Family of Degenerate Nonlinear Equations

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Chapter 2 : Min-Max Variational Principle and Front Speeds in Random Shear Flows | Jack Xin - calendrier

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In the small root mean square regime of shear flows, a new class of multi-scale test functions are found to yield speed asymptotics. Remarks are made on the conditions for the linear growth of front speed expectation in the large root mean square regime. The model equation is: The initial data u0 belongs to the set Is. Such speed asymptotics have been recently studied for both de- terministic fronts [3, 5, 8, 10, 9, 11, 13] and KPP fronts in random shears [12, 17]. See also [16] for related applied science literature. The bistable combustion front speed c has a min-max variational characterization [7, 8]. Following the notation of [8], define the functional: As b can be arbitrarily large though with small probability , our admissible test functions are not valid for the entire ensemble. We are unable to discuss the expectation of front speed. The paper is organized as follows. The test function 2. A straightforward computation shows that: The solvability of 2. It follows that equation 2. As in Lemma 2. It suffices to prove a uniform bound if the aj factor is one. The mixed derivative term is bounded as: The exponent in 2. As a consequence of these estimates, let us verify the admissibility of test function v. With v being an admissible test function, we see from 2. Such a limit holds for the KPP nonlinearity [3]. Let f be a bistable or combustion nonlinearity. Recall the inequality Lemma 3. Therefore, by Proposition 2. The O-U sample paths are almost surely continuous. If the covariance function is continu- ous, positive and non-negative definite, there exists a Gaussian R process with this covariance [2]. The symmetric integral operator: Moreover, the following estimate holds for all m: As before we use 2. We now conclude from Proposition 2. This argument is same as for the KPP case, see [12] for details. X would like to thank Professor M. Cranston for helpful communications. Pomeau eds, Kluwer, Doordrecht, Nirenberg, Travelling fronts in cylinders, Ann. Ryzhik, Bulk burning rate in passive-reactive diffusion, Arch Rat. Mech Analysis, , , pp. Toulouse, 8 , pp. Applied Math, 62, no. Ryzhik, Enhancement of the traveling front speeds in reaction-diffusion equations with advection, Ann. Majda, Parameterizing turbulent flame speed-Part I: Multiscale Modeling and Simulation, Vol. Xin, Reaction-diffusion fronts in periodically layered media, J. Physics, 63 , pp.

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