Flame front propagation IV: Random Noise and Pole-Dynamics in Unstable Front Propagation II

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The current paper is a corrected version of our previous paper arXiv:adap-org/9608001. Similarly to previous version we investigate the problem of flame propagation. This problem is studied as an example of unstable fronts that wrinkle on many scales. The analytic tool of pole expansion in the complex plane is employed to address the interaction of the unstable growth process with random initial conditions and perturbations. We argue that the effect of random noise is immense and that it can never be neglected in sufficiently large systems. We present simulations that lead to scaling laws for the velocity and acceleration of the front as a function of the system size and the level of noise, and analytic arguments that explain these results in terms of the noisy pole dynamics.This version corrects some very critical errors made in arXiv:adap-org/9608001 and makes more detailed description of excess number of poles in system, number of poles that appear in the system in unit of time, life time of pole. It allows us to understand more correctly dependence of the system parameters on noise than in arXiv:adap-org/9608001

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