Abstract for an Invited Paper
for the MAR09 Meeting of
The American Physical Society

A Reacting Particles System arising from the Conserved Kuramoto-Sivashinsky Equation[1]

DANIEL BEN-AVRAHAM[2], Clarkson University

We study an interacting particles system arising from a mapping to the Conserved Kuramoto-Sivashinsky equation. Particles represent vanishing regions of diverging curvature, joined by arcs of a universal parabola; nearest particles are attracted to one another at a rate inversely proportional to their distance, and coalesce upon encounter. Although the model is deterministic, a coarse-grained representation yields a diffusion equation with negative coefficient: the build up of instabilities corresponds to the coalescence events. A preliminary analysis of the model correctly predicts the growth of the typical inter- particle gap with time, but fails to reproduce interesting structure of the probability distribution function for the gap observed in simulations, including a non-trivial power-law at small distances, and a faster than gaussian decay at large distances. At yet an higher level of abstraction, trails of coalescing events may too be viewed as "particles" that propagate ballistically at a speed proportional to the background density, and that annihilate upon encounter.

[1]Support from NSF award PHY-0555312 is gratefully acknowledged.
[2]Work in collaboration with P. Politi (ISC CNR, Italy)