Non-local 1D conservation laws: when the shock wave is unstable

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We present spontaneously stochastic solutions for inviscid non-local conservation laws, which appear immediately after the blowup. Starting with the Burgers equation and continuing with the Sabra shell model of turbulence (as well as its continuous 1D representation), I will show how the model can be mapped into a dynamical system in renormalized coordinates and time. The renormalized system has a solution in the form of a traveling wave, which describes the universal evolution after a finite-time blowup. This wave is deterministic for the Burgers equation (corresponding to a shock), while it becomes stochastic for the Sabra model.