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The Statistical Hot Spot Model: Dimensionality and the Effects of Time-Distributed Nucleation LARRY HILL, Los Alamos National Laboratory — The Statistical Hot Spot (SHS) model examines heterogeneous reaction topology. The basic model assumes that 1) nucleation sites are randomly distributed in space, 2) burn waves initiate simultaneously, and 3) reaction spreads from nucleation sites as sharp, uniformly-sized spherical waves. Here, I consider how the depletion function, F, varies as certain assumptions are relaxed. I argue that non-idealities reflect a change in effective dimensionality, D, which skews F to the right or left. I further argue that typical HE material microstructures are such as to decrease D from the nominal value of three. This expectation agrees with SURF Reactive Flow Model, which gives better results for cylindrical hot spots than for spherical ones. I explicitly model the effects of time-distributed nucleation rates, and show that the effect tends to *increase* D from the nominal value of three. This is not to say that increased dimensionality is inconsistent with time-distributed nucleation; instead, the sensitivity of F to time-dependent nucleation is small because, above $D = 3$, F changes very little with D. I suggest that D should be treated as a modeling free-parameter, to approximately account for multiple non-idealities.

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