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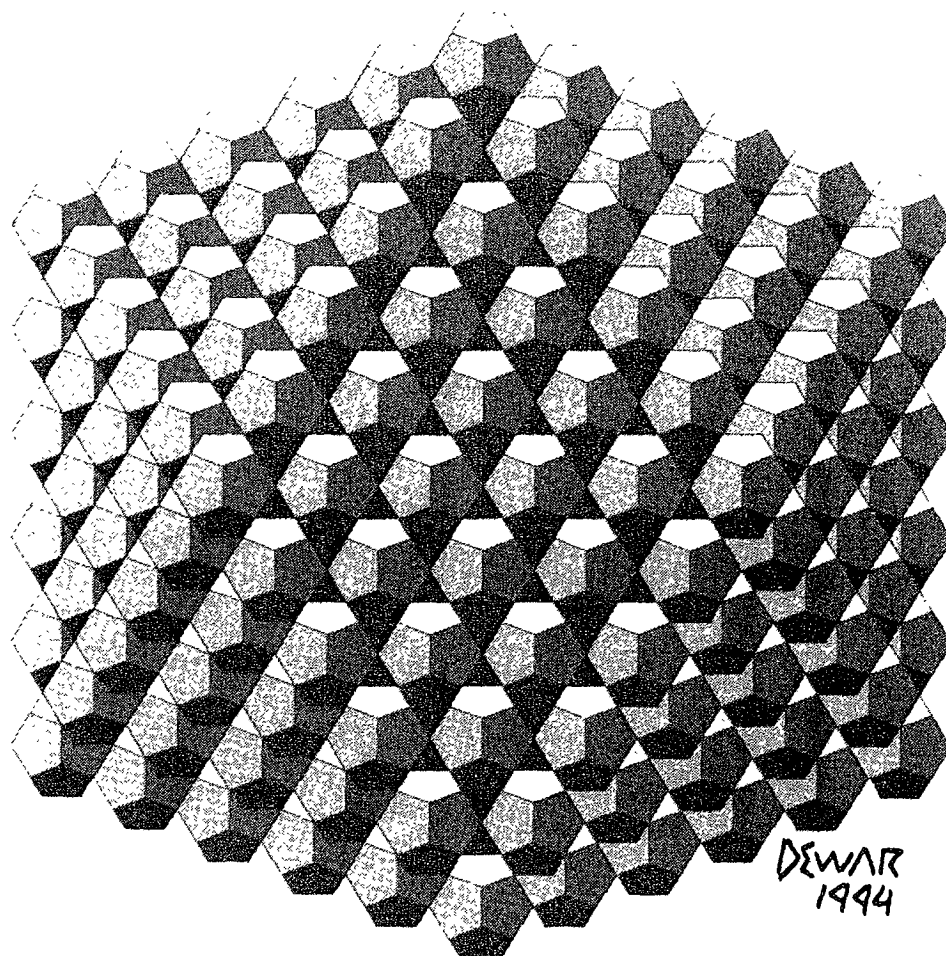
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Fractal and Power Spectrum Characterizations of On-Off Intermittency*[†]

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Some dynamical systems possess invariant submanifolds such that the dynamics restricted to the invariant submanifold is chaotic. This situation arises in systems with a spatial symmetry. The invariant submanifold could become unstable to perturbations in the transverse directions when a parameter of the system is changed through a critical value. This could result in an extreme form of temporally intermittent bursting called *on-off intermittency*.

We study a model that incorporates the universal features of systems that display on-off intermittency. We solve this model both with and without additive noise and we derive scaling results for the power spectral density of the on-off intermittent process and for the box counting dimension for the set of time interval when the process takes on values above a given threshold. We then study a numerical ordinary differential equation example with symmetry and verify our scaling results.