Complex Patterns in a Periodically Forced Surface Reaction

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Effects of time-periodic forcing on chemical turbulence are studied in experiments with catalytic CO oxidation on a platinum (110) single crystal surface. A variety of complex spatiotemporal reaction-diffusion patterns is investigated near harmonic resonance with the forcing. At relatively low forcing amplitudes, we observe intermittent turbulence characterized by turbulent bubble structures on the background of uniform oscillations. Sufficiently strong forcing produces resonant synchronous oscillations. Other phenomena include the formation of stripe patterns with multiple imperfections and the occurrence of chaotic cell arrays. Formation of irregularly shaped spatial domains is observed in a situation of coexisting resonances.

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