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Collective Behavior of Coupled Chemical Oscillators

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We utilize a variant of the BZ chemical reaction to examine emergent phenomenon in sets of coupled oscillators. In many studies involving the BZ reaction, the reaction is performed either in a homogeneous solution or on a quasi-2D continuous medium. In contrast, biological systems are normally composed of discrete cellular oscillators. Here we introduce a discretized version of the BZ reaction. In this system, the catalyst for the reaction is immobilized on individual ion exchange particles; each particle is then capable of acting as an independent oscillator. Coupling between the oscillators can occur via either exchange with the surrounding solution or can be imposed using light based feedback. The results from a number of biologically inspired coupling scenarios are discussed.