

M. J. B. Hauser, C. R. Chinake, R. H. Simoyi:
Breakdown of Symmetry, Spatiotemporal Patterns, and Travelling Waves in
Oxyhalogen- Sulfur Systems
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Abstract:

Spatial structures can occur in unstirred, originally homogeneous, nonlinear chemical systems far from equilibrium. Chemical waves are concentration variations of chemical species propagating in a system. Oxyhalogen-sulfur (compound) systems have produced novel chemical waves and spatial inhomogeneities when maintained far from equilibrium. Oxyhalogen-sulfur reactions proceed accompanied by large production of heat and protons at the wave fronts. This introduces density gradients induced by the travelling fronts as well as free convection which greatly affects wave front velocities. By allowing heat to be a factor in the wave propagation and pattern formation these systems much more closely resemble naturally occurring biological waves as well as flames. The role of hydrodynamics is also examined in the formation of spatiotemporal patterns.