Stirring Effect on the Belousov-Zhabotinsky Oscillating Chemical Reactions in a Batch. Experimental and Modelling

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We have studied the stirring effect on the time-delayed bifurcations of transient oscillations in the Belousov-Zhabotinsky (BZ) oscillating chemical reaction in a closed system. Experiments show that oscillations disappear through the time-delayed Hopf bifurcations, whose parameters depend on the stirring rate. The explanation of the stirring effect is based on the theories of diffusion-controlled reactions and hydrodynamic turbulence. We show that an increase of the stirring rate leads to an increase of the rate constant for the diffusion-controlled reaction. We propose a kinetic scheme that describes the effect observed in the experiments. A good agreement between the experimental data and the simulations is obtained.

Key words: Stirring Effect; Diffusion-Controlled Reactions.