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on Fundamental and Applied Aspects of
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and

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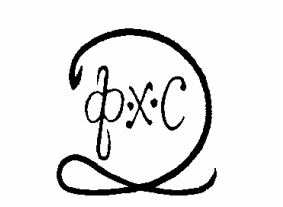

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VARIOUS DINAMICAL STATES IN THE BRAY- LIEBHAFSKY OSCILLATORY REACTION- FROM PERIODICITY TO INTERMITTENT CHAOS

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ABSTRACT

The Bray-Liebhafsky (BL) is one of the most analyzed oscillatory reaction both experimentally and numerically. Most of the experimentally obtained dynamical states of this reaction realized in a continuously fed well stirred tank reactor (CSTR) are successfully simulated. Beside others, numerous structured chaotic dynamical states were obtained between each two periodic states in the period doubling rout to chaos with respect to specific flow rate as the control parameter. It was an universal scenario throughout the whole mixed-mode region, as well as throughout other mixed-mode regions obtained under different initial conditions. However, the intermittent oscillations consistent of chaotic mixture of large-amplitude relaxation oscillations, grouped in bursts and small-amplitude sinusoidal ones or even quiescent parts between them known as gaps were also generated experimentally in the Bray–Liebhafsky reaction by varying different parameters such as temperature, flow rate or reactant concentrations under CSTR conditions. Nevertheless, it will be shown here that intermittent oscillations can be simulated by already published model of the BL reaction network.

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REFERENCES

[1] W. C. Bray, J. Am. Chem. Soc., **43** (1921), 1362.
[2] W. C. Bray and H. A. Liebhafsky, J. Am. Chem. Soc., **53** (1938), 38.
[3] A. Z. Ivanović, Ž. D. Čupić, M. M. Janković, Lj. Z. Kolar-Anić, S. R. Anić, Phys. Chem. Chem. Phys., **10** (2008), 5848.
[4] Bubanja, I. N., Ivanovic-Šašić, A., Čupić, Ž., Anić, S., and Kolar-Anić, Lj. Russ. J. Phys. Chem. A **91** (2017), 2525.
[5] Bubanja, I. N., Maćešić, S., Ivanović-Šašić, A., Čupić, Ž., Anić, S., and Kolar-Anić, Lj., Phys. Chem. Chem. Phys., **18** (2016), 9770
[6] Itana Nuša Bubanja, Ana Ivanovic-Šašić, Željko Čupić, Slobodan Anić and Ljiljana Kolar-Anić, Frontiers in Chemistry, **8** (2020), 560274