

Prospective side effects of the heat and mass transfers in microporous structure of char during intermediate and final stages of the high-temperature pyrolysis

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The general problem of a decrease of activation energy for reactions of thermal decomposition in ligno-cellulosic materials in the end of the high-temperature pyrolysis has been discussed. Experiments emphasizing the differences between the starting, intermediate and final stages of the process were conducted. A hypothesis to solve the problem from the point of view of a fundamental fractal theory was formulated. The conclusions of the discussions related to the hypothesis gave a description of new experiments to prove the fundamental theory on diffusion processes with naturally or artificially created conditions for self-organization.

Local dynamics of the oscillators array in Scott experiment

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The physical base of this work was the experiment of English physicist and mathematician Elwin Scott, who investigated two-dimensional arrays (4×4) of active oscillators with tunnel diodes. This system allow to get a large quantity of coexistent different stable modes, which will be able to be used, for example, for information storage or like a switch in a complicated devices and so on or like one of the future model of associative memory. During the investigation we considered the chain of such oscillators and the original array 4×4 . We used the standard local analysis methods, especially the normal forms method, which was described in articles by Arnold V., Shilnikov L. and others and then developed by Kolesov Yu. We built the normal forms of the under consideration systems in case of the absence and the presence of internal frequencies resonance. In both cases we succeeded to prove the effect of the quantity increasing of coexistent one-component stable modes and show, that all modes with two or more components are unstable. The numerical experiments were carried out to confirm the theoretical results.