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**Non-Harmonic Pressure Fluctuations by the Self-Excited Oscillations in a Reactor-Column** HASSON M. TAVOSSI, Valdosta State University, Department of Physics, Astronomy, and Geosciences — Self-excited non-harmonic pressure oscillations that result from non-linearity in the system are generated in an air-flow in a reactor column. The uniform steady flow is converted spontaneously into an oscillatory flow, under the especial experimental conditions in a reactor column that includes a thin layer of dissipative porous medium. The resulting large-amplitude non-harmonic pressure fluctuations in the air-flow are similar to the bifurcation in chaotic systems; where two or more energy states can occur simultaneously, with the system oscillating between them. Experimental results will be presented to demonstrate this abrupt change in flow-regime, from steady-flow to chaotic turbulent vibrations. Our results show that a low-pressure shock-wave-front is established in the column and precedes the self-excitation oscillations in the system. Results show that there exists a threshold for flow-rate, beyond which the transition from steady-flow to pulsating-flow occurs. A numerical model is developed to express this behavior in terms of system variables, such as; dominant frequencies, obtained from fast-Fourier-transforms of time-domain pressure signals, flow-rate, dimensionless aerodynamic characteristic numbers, relaxation-time, and energy dissipation in the system.

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