A nonlinear dynamical system for combustion instability in a pulse model combustor KAZUSHI TAKAGI, HIROSHI GOTODA, Department of Mechanical Engineering, Tokyo University of Science, 6-3-1 Niijuku, Katsushika-ku, Tokyo 125-8585, Japan — We theoretically and numerically study the bifurcation phenomena of nonlinear dynamical system describing combustion instability in a pulse model combustor on the basis of dynamical system theory and complex network theory. The dynamical behavior of pressure fluctuations undergoes a significant transition from steady-state to deterministic chaos via the period-doubling cascade process known as Feigenbaum scenario with decreasing the characteristic flow time. Recurrence plots and recurrence networks analysis we adopted in this study can quantify the significant changes in dynamic behavior of combustion instability that cannot be captured in the bifurcation diagram.

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Date submitted: 02 Aug 2016   Electronic form version 1.4