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**Dynamic behavior of combustion instability in a lean premixed gas-turbine combustor** HIROSHI GOTODA, TAKAYA MIYANO, Ritsumeikan University, SHIGERU TACHIBANA, Japan Aerospace Exploration Agency — Periodic and chaotic behavior in combustion dynamics that can be observed as a result of combustion instabilities in fundamental and practical combustion systems are of importance to present-day combustion physics and nonlinear science research. We experimentally investigate the dynamic behavior of the combustion instability in a lean premixed gas-turbine combustor from the viewpoint of nonlinear dynamics (Gotoda. H et al., Chaos, vol. 21, 013124, 2011). A nonlinear time series analysis clearly reveals that as the equivalence ratio increases, the dynamic behavior of the combustion instability undergoes a significant transition from stochastic fluctuation to periodic oscillation through low-dimensional chaotic oscillation. We also show that a nonlinear forecasting method is useful for predicting the short-term dynamic behavior of the combustion instability in a lean premixed gas-turbine combustor, which has not been addressed in the fields of combustion science and physics.

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