

Research Report (April, 2019 - March, 2020)

Enrollment from
April 2018

Department of Applied Mechanics and Engineering

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I. List of Papers

1. ○Sakata, Y., Fujisawa, N., Ohta, Y. and Kato, Dai., "Effects of forward sweep in an axial compressor rotor under inlet distorted inflow condition", Transactions of the JSME (in Japanese). (Under review)
2. Hamaguchi, K., Sakata, Y., Fujisawa, N., Ohta, Y. and Kato, D., "Effect of Forward-Swept Rotor on Stall Margin in an Axial Flow Compressor at Distorted Inflow Condition", International Journal of Gas Turbine, Propulsion and Power Systems. (Under review)

II. List of Talks

1. ○Sakata, Y., Ando, S., Nobumichi, F. and Ohta Y., "Development of Rotating Stall Cell under Coexisting Phenomena of Surge and Rotating Stall in an Axial-Flow Compressor", Proceedings of the AJKFLUIDS 2019 Joint Fluids Engineering Conference (SanFrancisco), July, 2019.
2. Hamaguchi, K., Sakata, Y., Fujisawa, N., Ohta, Y. and Kato, D., "Effect of Forward Swept Rotor on the Stall Type in Axial Compressor", Gas Turbine Society of Japan (Hakodate), September, 2019.
3. Hamaguchi, K., Sakata, Y., Fujisawa, N., Ohta, Y. and Kato, D., "Effect of Forward-Swept Rotor on Stall Margin in an Axial Flow Compressor at Distorted Inflow Condition", IGTC 2019 (Tokyo), September, 2019.

III. Research Results in AY2019

Study Study on flow phenomena under off-design operation of axial-flow compressors were conducted. First, the relationship between the growth of the stall cell and variation in the surge behavior was experimentally investigated. The result showed that the key factors that determine the surge behavior are the sudden change in the flow field near the peak point of the unsteady characteristics and the rapid growth in the stall cell during the stalling process. Effects of forward-swept rotor application on compressor characteristics and stall margin under inlet distorted inflow condition were investigated by experiment. The result was summarized in the JSME paper (under review). The stall inception mechanism under distorted inflow condition was investigated by using numerical simulation, and the result is in progress.

IV. Research Plan for AY2020

We are planning to submit a paper to the Transactions of the JSME. The paper reports on the numerical results of the effects of the forward swept blades application, on the compressor characteristics and the mechanism of compressor stall under the distorted inflow condition. Then, the next paper will report on the effects of the tip clearance variation on the compressor stall in the normal inflow and the inlet distorted condition. Whole research findings will be summarized in doctoral thesis.