

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Support-Free Measurements of Aerodynamic Characteristics of Axial Circular Cylinders with Fineness Ratio from 0.50 to 0.75 HAYATO NAGAIKE, HIROYUKI OKUIZUMI, YASUFUMI KONISHI, HIDEO SAWADA, TAKU NONOMURA, KEISUKE ASAI, Tohoku Univ — In this study, aerodynamic characteristics of axial circular cylinders having the fineness ratio (length to diameter, L/D) of 0.50, 0.67 and 0.75 were measured using the 1-m Magnetic Suspension and Balance System (MSBS) in the Low-Turbulence Wind Tunnel at Tohoku Univ. The MSBS supports and controls the model using magnetic forces. All the tests were conducted at $Re = 100,000$ and the models were aligned with the free stream. The results of force measurements show that the drag decreases gradually in the L/D range from 0.50 to 0.75 and connects continuously to the data for higher fineness ratios. This indicates that a local maximum of the drag does not exist in this range. The previous studies show that, for axial circular cylinders having L/D from 1.0 to 2.0, the drag measured using a MSBS differs substantially from the value measured with sting support, however this study shows that a circular cylinder of $L/D = 0.50$ has a drag close to that measured with sting support. This suggests that the influence of support interference is significant when a shear layer separated from the leading edge reattaches on the body or interacts near the base, but is insignificant when a separated shear layer is away from the base area.

Hayato Nagaike
Tohoku Univ

Date submitted: 01 Aug 2017

Electronic form version 1.4