Measurement of Air Flowrate in an Engine Inlet Duct

for Altitude Engine Tests

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The altitude engine test have been carried out to measure performance of the gas turbine engine of flight vehicle at high altitude and flight speed environment prior to the flight test. Air flowrate in the engine inlet is one of significant parameters to calculate the representative performance values such as the net thrust and the specific fuel consumption of gas turbine engine. In altitude engine test facility of Korea Aerospace Research Institute (KARI), air flowrate is calculated by static, total pressure and temperature measured in engine inlet duct. In present study, in order to verify air flow rate measurement at engine inlet duct of KARI altitude engine test facility, inlet flow measurement devices such as total pressure rake, total temperature rake and boundary layer rake were tested in high pressure gas flow standard system of Korea Research Institute of Standards and Science (KRISS). The sonic nozzle calibrated by a gravimetric flow standard in KRISS are used as a reference meter with flowrate 10,000 m3/h, pressure range up to 50 bar and expanded uncertainty(*k*=2) 0.18%. Air flowrate obtained by area-weighted average duct Mach number in inlet flow measurement devices of KARI engine inlet duct are compared with reference flowrate of sonic nozzles in KRISS up to Ma=0.2.