Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

LES versus URANS for flow in a centrifugal pump[1] BEOMJUN KYE, HAECHEON CHOI, Seoul Natl Univ — Turbulent flows in a centrifugal pump at design and off-design conditions are simulated using two different numerical methods, i.e., large eddy simulation (LES) and unsteady Reynolds-averaged Navier-Stokes equations (URANS), respectively, and we suggest from comparisons of two solutions which flow characteristics cannot be identified from URANS. URANS provides overall flow features within the impeller and volute at the design condition, but overestimates the pressure rise in the discharge pipe as it does not predict unsteady large-scale corner vortices which grows larger with increasing flow rate. This results in a performance mismatch between URANS and LES even at the design condition. At the off-design condition, URANS fails to accurately resolve unsteady flow features such as flow separation at the volute tongue and leakage to cavities which are caused by strong impeller-volute interaction. We will further investigate difference between two solutions to better understand unsteady flow characteristics in a volute-type centrifugal pump.

[1]This work was supported by the National Research Foundation of Korea (2019R1A2C2086237) and the Korea Institute of Science and Technology Information (KSC-2019-CRE-0114).

Haecheon Choi
Seoul Natl Univ

Date submitted: 03 Aug 2020 Electronic form version 1.4