**Comparing a data-based approach and a physics-based approach
for wall modeled LES of flow in a spanwise rotating channel** XIANG YANG,
XINYI HUANG, Penn State University — The logarithmic law of the wall is a
poor approximation of the mean flow in a spanwise rotating channel, and therefore
a wall model that leads to the logarithmic mean flow at equilibrium conditions
is inadequate for wall modeled LES (WMLES) of spanwise rotating channels. In
this presentation, we will develop a wall modeling capability for flow in a spanwise
rotating channel. In particular, we will compare a data-based modeling approach
and a physics-based approach: the physics based model relies on an eddy viscosity
that yields the correct linear mean flow at high rotation numbers, and the data-based
model is a feed-forward neural network (FNN) that is trained using the available
mean flow data. FNNs are often criticized for not generalizing well. Here, informed
about our (albeit limited) knowledge of the flow, the FNN is found to provide good
mean flow predictions within and outside the training dataset. In conclusion, data-
based models are useful alternatives to physics-based models.

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