Modeling Gust in Model Reduction Framework MEHDI GHOM-
MEM, IMRAN AKHTAR, MUHAMMAD HAJJ, ISHWAR PURI, Virginia Tech —
Determining gust effects on fluid flows and fluid structure interactions is important
in many applications. Direct numerical simulations of these effects may be very
expensive. This is especially true in cases where gust parameters could vary. The
overall goal of this effort is to develop tools and reduced-order models that are ca-
pable of assessing gust effects and that can be used for flow control or uncertainty
quantification of flow parameters. As such, we simulate the flow past a circular cylin-
der with and without an incoming gust. Proper orthogonal decomposition (POD)
is performed on the simulated flow data to compute the dominant basis functions
(modes) using the method of snapshots. The results show that reduced-order mod-
els from steady flow cannot be readily used to develop reduced-order models for the
same flow with incoming gust. Methodologies to incorporate gust effect within the
reduced-order model are discussed.

Imran Akhtar
Virginia Tech