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**Projection of spatial shear layers in a symmetry-reduced space**[1]
BASHAR QAWASMEH, MINGJUN WEI, New Mexico State University — Symmetry reduction technique has been successfully combined with traditional Proper Orthogonal Decomposition/Galerkin projection method to obtain models with very low dimension for temporal shear layers (Wei and Rowley, 2008). This study extends the approach to spacial shear layers. A scaling variable is introduced to factor out the downstream viscous growth, and therefore results in a projection model with fewer basis functions. However, Navier-Stokes equations have different characteristics along time and space. Firstly, we need to remove the stream-wise ellipticity to strictly develop a dynamic system evolving downstream. Secondly, the spatial developing term is from nonlinear convection instead of linear time-advancement for temporal case. These two problems are addressed in this study, and 2- and 4-mode models are developed respectively to capture single-frequency behavior (e.g. vortex roll-up) and double-frequency behavior (e.g. vortex pairing).

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