Conference Agenda

Presentations including 'paloma'

MS 18a: Advances in high order methods for fluid dynamic
Time: 13/July/2021: 12:00pm-2:00pm · Virtual location: Zoom 2 ↗

1:30pm - 2:00pm

POD analysis of temporal flow patterns in different regimes

Paloma Gutierrez-Castillo[1]**, Manuel Garrido-Martin**[1]**, Becca Thomases**[2]

[1]University of Malaga, Spain; [2]University of California, Davis

Proper Orthogonal Decomposition (POD) has been used broadly in analyzing turbulent flows at high Reynolds numbers, such as flow in a pipe. However, there exists a lack of knowledge in analyzing some other regimes which contain interesting temporal behaviors. We present two study cases with completely different flow regimes showing the advantages of analyzing them using POD. First, we describe an application in creeping flow (very low Reynolds number) in Non-Newtonian fluids. POD helps characterize the different bifurcations of the flow directly related to the movement of stagnation points of the problem. We have also proved the efficiency of this method to store data recovering 90% of the temporal evolution with only a few geometric modes (time-independent) and some temporal modes, which are a single value for each time. Second, we analyze experimental data of a wing tip vortex at moderate Reynolds numbers. The possible attenuation of this kind of vortices is a key criterion for any airport design. By using POD, we were able to describe the vortex and isolate a mode representing the global attenuation of the vortex.