

CASTS Talk

Vortex dynamics and kinematics by means of the Lamb vector and its properties

Dr. IlYong Ryu

2016 - 01 - 28 (Thu.)

15:30 - 17:30

308, Mathematics Research Center Building (ori. New Math. Bldg.)

In many applications of computational fluid dynamics (CFD), plot of streamlines, pathlines and streaklines from either the predicted or the measured velocity field can give a unique representation of the flow under investigation. However, these vector lines generated from the velocity field are not enough to capture a physically relevant picture of the flow. To gain a better understanding of the kinematics and the dynamics of flows around a moving object, the Lamb vector can be considered as a good candidate since it plays a key role in incompressible fluid dynamics and vortex dynamics. In particular, the Lamb vector appears prominently in Lagrange's acceleration and its character of potential/vorticity decomposition is a significant factor in the nature of complex flows.

Therefore, in this study, I will present the computational results of the flow field around a cylinder either in motion or rest to explore the vortex dynamics and kinematics of flows past an oscillating cylinder using the Lamb vector and its properties. In addition, I will introduce an alternative way to satisfy the topology rule proposed by Hunt in case of flow problem including a moving object.

