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Mechanism of Secondary Instability of Flow around a Circular Cylinder HUA-SHU DOU, Zhejiang Sci-Tech University, AN-QING BEN, Longshine Technology Com. Ltd., FLUID MECHANICS RESEARCH TEAM TEAM — Flow around a circular cylinder in infinite domain is simulated with large eddy simulation at Re=200, and the mechanism of the origin of secondary vortex street is analyzed. The simulation results show that the vortex street generated in the cylinder near wake disappears as the flow moving downstream. Secondary instability occurs in far wake of the cylinder after the primary vortex street dying away. The processes of first instability and secondary instability in the cylinder wake are recorded in the simulation. The instability of the entire flow field is studied with the energy gradient theory. It is found that it is the high value of the energy gradient function generated by the zero velocity gradients that leads to the instability. As the vortex developing at rear of the cylinder, the value of the energy gradient function becomes low downstream, which leads to the vortex dying away. At further downstream, the value of the energy gradient function is enlarged again because of the role of perturbation, which leads to the secondary instability. It can be concluded that the interaction of the variation of the value of the energy gradient function and the perturbation leads to the occurrence of secondary instability.

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