1. Visualization of flow structure around two cylinders

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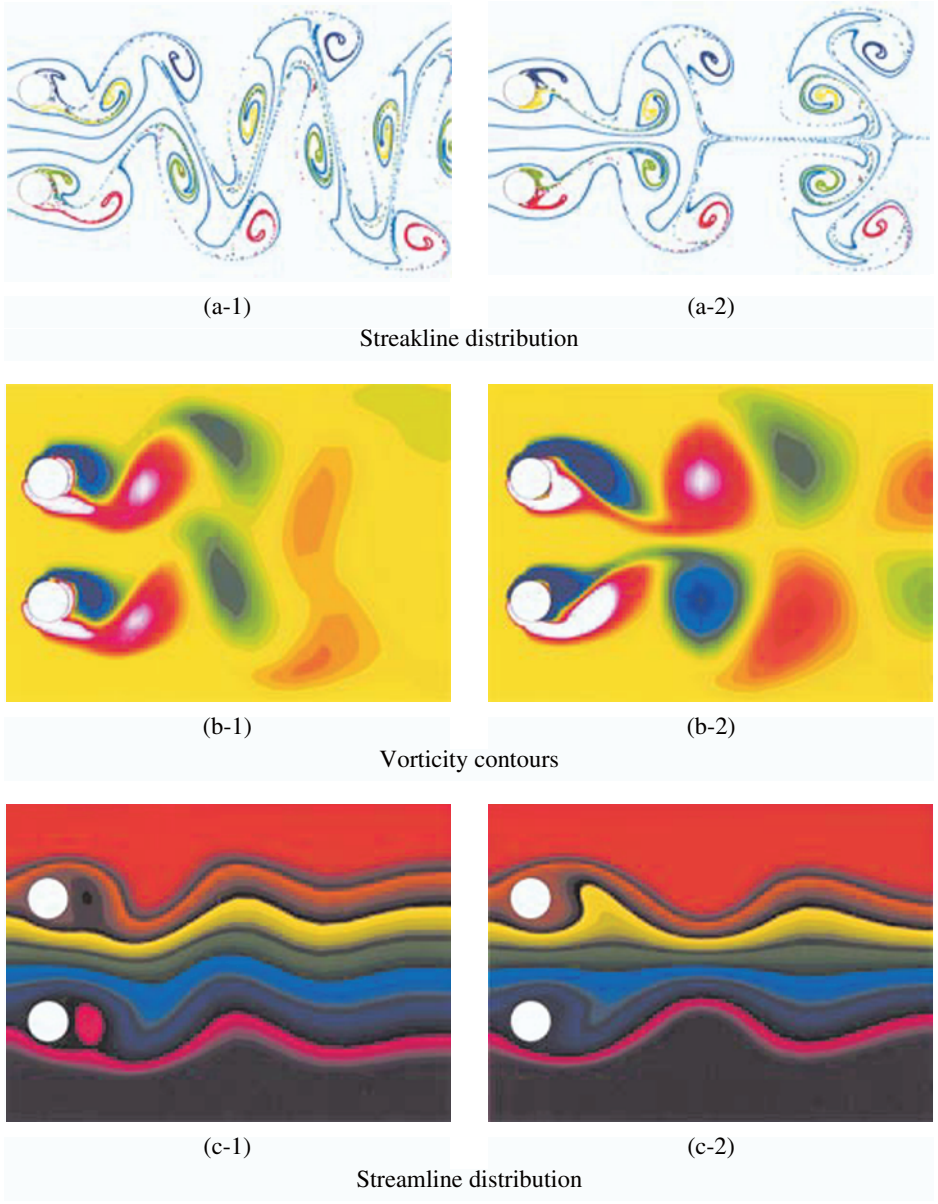

Figures (a) (b) (c) show the results of unsteady computation for two-dimensional flow around circular cylinders using generalized conservation of circulation model. (a-1) (a-2) respectively show the streakline distribution behind two side-by-side cylinders at Re=200 and T/D=3.0, where T and D are the center to center distance between the cylinders and the cylinder diameter, respectively. (b-1) (b-2) show the vorticity contour, and (c-1) (c-2) show the streamline distribution. The studies confirmed that the vortex-shedding synchronization (both in-phase or anti-phase) exist when the gaps between cylinders are in range 2.0<T/D<4.0. It is also noticed that the in-phase flow pattern is the preferred stable mode at Re=200. When no disturbance or only a very small disturbance is introduced into the flow at initial time, it is found that the flow structure will remain in anti-phase state within the range of Re=100 to 2000. However, when a bigger disturbance is introduced, the flow will settle to a stable in-phase pattern after a long time. At Re=3000 and 10000, the anti-phase vortex shedding seems to be the only stable flow pattern.