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Generation features of the coherent vortex structures by cavities and bumps on a streamlined surface

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Discontinuity streamlined surface in the form of cavities and bumps are widespread in nature and technology. In the conditions of turbulent flow they generate coherent vortex structures which significantly increase the mixing and mass transfer processes over streamlined surfaces. The large-scale vortex structures, circulating and jet currents are formed inside the cavities [1]. They generate intensive fields of velocity, pressure, temperature, vorticity, and also periodically and quasiperiodically are ejected outside of cavities in boundary layer. Horseshoe and wake vortices are generated about bluff body when a boundary layer is separated from streamlined surface [2]. These vortex structures, under certain flow conditions, in the wake of the bumps form the Karman vortex street. The presence of coherent vortex structures in shear and separation flows leads to changes in the space-time characteristics of the flow. The wave and frequency spectra appear tonal components, which are caused by the characteristic features of the formation and evolution of vortex structures inside and around the streamlined surface discontinuities. Cross-correlation and spectral functions allow to identify the scale, lifetime, direction and transfer velocity of the coherent vortex structures [1-3].

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[3] V. A. Voskoboinick, A. P. Makarenkov, *Intern. J. Fluid Mech.*, **31**, № 1, (2004), p. 87-100.