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Numerical Study of Boundary Layer Receptivity to Periodic Vortical Disturbances in Freestream YU NISHIO, SEIICHIRO IZAWA, YU FUKUNISHI, Tohoku Univ — A flow passing a flat plate with an elliptic leading edge whose aspect ratio is 5 is simulated to investigate its receptivity to periodic vortical disturbances in the freestream. The disturbance consists of vortex pairs aligned in the spanwise direction, whose rotational directions are opposite. When they successively collide to the leading edge of the flat plate, streamwise vortices appear in the boundary layer downstream. The tilting and stretching of oncoming vortex columns with their axes normal to the flat plate was believed to be the cause of the generation of the streamwise vortices. However in this study, it is shown that the streamwise vortices in the boundary layer is generated by a combination of the spanwise velocity induced by the parts of vortices outside the boundary layer and the no-slip condition at the wall.

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