

Abstract Submitted  
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**Transient growth of disturbances in near-wall region of turbulent channel flow** EUIYOUNG KIM, HAECHEON CHOI, Seoul National University, JOHN KIM, UCLA — The transient growth of optimal disturbances has been suggested as a part of self-sustaining process of turbulent structures. It is generally accepted that the self-sustaining process is independent of the outer part of a boundary layer. In this study, we investigate the relationship between the optimally amplified disturbances in the near-wall region and turbulent structures in turbulent channel flows for  $Re_\tau = 180$  to 10000. Optimal disturbances in a confined domain ( $0 < y^+ < y_c^+$ ) are considered and disturbances at  $y^+ > y_c^+$  are damped out. The most amplified disturbances in a confined domain are streamwise velocity streaks that are induced by streamwise vortices. The wavelength, growth, and growth time of disturbances are almost independent of  $Re_\tau$  when they are normalized by viscous wall units. They increase with the domain height  $y_c^+$ . Especially, the optimal disturbance in  $0 < y^+ < 40$  shows good agreement with the near-wall structures of turbulent channel flow.

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