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**Wavelet-based identification of localized turbulent regions in a transitional boundary layer** JOE YOSHIKAWA, YU NISHIO, SEIICHIRO IZAWA, YU FUKUNISHI, Tohoku Univ — A numerical study in order to develop a method to identify localized turbulent regions in a transitional boundary layer is carried out using a wavelet transformation. Finding the onset of turbulence is quite difficult because it is not easy to distinguish the localized turbulent regions from “non-active” groups of vortices. The base flow with low-speed streaks is generated by placing an array of obstacles. Then a short duration jet is ejected from the wall into the low-speed streak. First, a hairpin vortex appears in the laminar boundary layer which travels downstream growing up. Downstream, localized turbulent regions appear in the boundary layer, where a lot of vortices are entangled with each other. A wavelet analysis is applied to the spatial waveforms of streamwise velocity fluctuations obtained from these two flow fields. It is shown that the hairpin vortex appears as a high amplitude spot in the wavelet spectrum, which is small in both wavenumber-wise and streamwise scales. On the other hand, the isolated turbulent region appears more wide spread in the wavenumber-wise scale. So, using this method, localized turbulent regions can be identified.

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