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Spanwise extent and time persistence of uniform momentum zones in zero-pressure gradient turbulent boundary layers[1] SHEVARJUN SENTHIL, CALLUM ATKINSON, LTRAC, DMAE, Monash University, JAVIER JIMENEZ, E.T.S. Ingenieros Aeronauticos, Universidad Politecnica de Madrid, JULIO SORIA, LTRAC, DMAE, Monash University — A time-resolved zero-pressure gradient turbulent boundary layer direct numerical simulation at $Re_\tau = 1,176$ has been used in this study. Uniform momentum zones (UMZs) have been investigated from the following points of view: (i) streamwise extent up to 6 boundary layer thickness, (ii) spanwise extend up to 6.5 boundary layer thickness and (iii) time persistence up to 3 convective time scales. Probability density functions (PDFs) of the number of UMZs have been investigated using 200 time-resolved velocity fields. Using these PDFs, PDFs of the number of UMZs have been computed as a function of extent in the streamwise direction, confirming the previous result that a domain of 2 boundary layer thickness in the streamwise extent is the appropriate length scale to determine UMZs. In the spanwise direction, this is found to be shorter being only one-tenth of a boundary layer thickness, yielding an equal probability of finding 1 or 2 UMZ with a width of 0.1 boundary layer thickness. It is found that some UMZs with a streamwise extent of 2 boundary layer thickness, a spanwise extent of 0.1 boundary layer thickness will have a time persistence of 1 convective time scale.

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