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Flow characteristics of infinite-span wings with wavy leading edges[1] RAFAEL PEREZ-TORRO, JAE-WOOK KIM, Univ of Southampton — Implicit LES computations are performed for an infinite-span wing based on the NACA0021 aerofoil section with a sinusoidal wavy leading edge (WLE). At $Re_\infty = 1.2 \times 10^5$ and $M_\infty = 0.3$, the computations performed in this study show that three-dimensional laminar separation bubbles (LSBs) form at troughs of the undulated wing. Prior to stall, LSBs can be found in all troughs. However, past the stall angle, LSBs tend to group together in a collocated fashion, leaving regions of complete separation in between groups where a separated shear layer (SSL) is formed. It is found that the size of the LSB group is highly dependent on the number of WLE wavelengths used in the spanwise-periodic domain. The LSB group formation process is investigated by means of simulations where the geometry is slowly pitched from an angle of attack of $\alpha = 10^\circ$ to $\alpha = 20^\circ$. The study also includes the analysis of instantaneous flow fields using Proper Orthogonal Decomposition (POD) and Dynamic Mode Decomposition (DMD) techniques.

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