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The effects of weak stratification on turbulence within a mixing layer ROI GURKA, Ben-Gurion University, ELIEZER KIT, Tel-Aviv University — In mixing-layers between two parallel streams of different densities, shear and gravity effects interplay; buoyancy acts as a restoring force and the Kelvin Helmholtz mode is known to be stabilized by the stratification. The effect of stratification on streamwise and spanwise vortical structures in the stratified mixing layer has been investigated numerically (DNS) and experimentally (PIV). Two cases were compared: homogeneous flow (Ri=0) vs. weakly stratified (Ri=0.03). Mixing of the heated upper layer with unheated lower layer occurred in the wake of the splitter plate with attached oscillating Chevron type flappers. Controlling the attached to splitter plate flappers enabled to form different type of disturbances (2D and 3D) followed by various types of instabilities within the mixing layer. It was found that the energy of 3D modes at the initial stage increased faster in the case of stratified flow compared to the homogeneous case, indicating that some of the modes are convectively unstable and growth faster than they do in homogeneous flow. In addition, the lateral RMS distribution of the velocity components in stratified case was wider indicating faster spreading of the mixing layer. Those points out to convective instability within the primary roll caused by the density layers overturn occurring throughout the roll formation.

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