PREDICTING AND MITIGATING BLAST LOADING ON THE HEAD BENEATH A MILITARY HELMET

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We apply computational fluid dynamics and experiments to understand the aerodynamic loading on the helmeted head due to blast events. Experiments and computations agree that the maximum under-helmet pressures are produced on the side of the head away from the source of the blast, and the computations suggest that pressure waves that infiltrate the gap between the helmet and head interact under the helmet to generate the peak pressures. The current work quantifies the effect of helmet geometry and blast location on under-helmet pressures and explores the use of novel helmet and suspension geometries to disrupt these wave interactions under the helmet. Specific helmet shell geometries considered in the study include the Army's ACH and Marine Corps's LWH, and the suspensions tested include open gap (i.e., no suspension), the current LWH pad suspension, and a proposed post-based suspension. Current results suggest that tailoring the geometry, particularly in the case of the post-based suspension, has the potential for reducing under-helmet peak pressures.