

External Store Safe Separation Evaluation Process Implementing CFD and MIL-HDBK-1763

Authors : Thien Bach Nguyen, Nhu-Van Nguyen, Phi-Minh Nguyen, Minh Hien Dao

Abstract : The external store safe separation evaluation process implementing CFD and MIL-HDBK-1763 is proposed to support the evaluation and compliance of the external store safe separation with the extensive using CFD and the criteria from MIL-HDBK-1763. The criteria of safe separation are researched and investigated for the various standards and handbooks such as MIL-HDBK-1763, MIL-HDBK-244A, AGARD-AG-202 and AGARD-AG-300 to acquire the appropriate and tailored values and limits for the typical applications of external carriages and aircraft fighters. The CFD and 6DOF simulations are extensively used in ANSYS 2023 R1 Software for verification and validation of moving unstructured meshes and solvers by calibrating the position, aerodynamic forces and moments of the existing air-to-ground missile models. The verified CFD and 6DoF simulation separation process is applied and implemented for the investigation of the typical munition separation phenomena and compliance with the tailored requirements of MIL-HDBK-1763. The prediction of munition trajectory parameters under aircraft aerodynamics interference and specified rack unit consideration after munition separation is provided and complied with the tailored requirements to support the safe separation evaluation of improved and newly external store munition before the flight test performed. The proposed process demonstrates the effectiveness and reliability in providing the understanding of the complicated store separation and the reduction of flight test sorties during the improved and new munition development projects by extensively using the CFD and tailoring the existing standards.

Keywords : external store separation, MIL-HDBK-1763, CFD, moving meshes, flight test data, munition.

Conference Title : ICAMAME 2025 : International Conference on Aerospace, Mechanical, Automotive and Materials Engineering

Conference Location : Seoul, Korea, South

Conference Dates : April 17-18, 2025