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# Grid-mode transonic store separation analysis using modern design of experiments

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## Abstract

The analysis of the separation of a Precision Guided Munition (PGM) from many configurations of an advanced jet trainer was performed using aerodynamic data from wind-tunnel tests characterised using the grid method. As strong aerodynamic mutual interference is present due to transonic shockwaves between the wing of the aircraft and the tail of PGM the loads on the store changes significantly for different combinations of PGM position and orientation relative to the aircraft. This means that the grid method must sample a wide range of positions and orientations. If this is done in usual manner, the grid test matrix is large and costly. There is another method for efficiently characterising phenomena with a number of mutually interacting variables known as the Modern Design of Experiments (MDOE) which can significantly reduce the number of grid samples required. The possibility of developing the grid test matrix using the MDOE method is investigated using a simple panel code model. The correct approach to implement the MDOE grid method is identified and the relative interpolation errors are characterised. The application of the MDOE method to the trainer jet/PGM separation wind-tunnel test is described.