

RESPONSE OF A PANEL WALL SUBJECTED TO BLAST LOADING

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Previous calculations of the acceleration behavior of a panel wall subjected to blast loading using the model analysis option in the FE-code ASKA showed bad agreement with experiment. Similar comparison in the USA using the FE-code NASTRAN also show poor agreement. The purpose of these calculations was to determine the shock loading of electronic equipment fixed to the panel wall. The accurate calculation of displacements, velocities and accelerations due to shock loading is very sensitive to the correct modeling of the dominant frequencies of the structure and is a very challenging problem for a FE-code.

These were the reasons, as a warm-up exercise, to compare the different methods to solve the equation of motion especially with respect to loading with high frequency content.

The FE-code ADINA turned out to be a very appropriate tool for this study because it incorporates model analysis solution as well as a number of direct integration methods.

While the displacements show excellent agreement for all 3 types of analysis, the solution for velocity and acceleration progressively diverges. In general the model analysis tends to smooth out the peaks and average the time history curves (this is especially true for accelerations). This results in a totally wrong maximum amplitude (which is very important for shock loading) and of course in the complete disappearance of higher frequencies compared with direct integration.

Using this method a comparison was next made using a simple averaged loading according to handbook methods (as in the ASKA calculation) and a numerically computed loading. The computed loading for each single element was calculated by the HULL-Hydrocode. For the response calculation the

HULL output was matched to the ADINA input format. The influence of the different loadings to the response parameters was considerable. The importance of a proper loading turns out to be essential for accurate acceleration results.