

Nonlinear Vibrations of Aerospace Structures

Tutorial

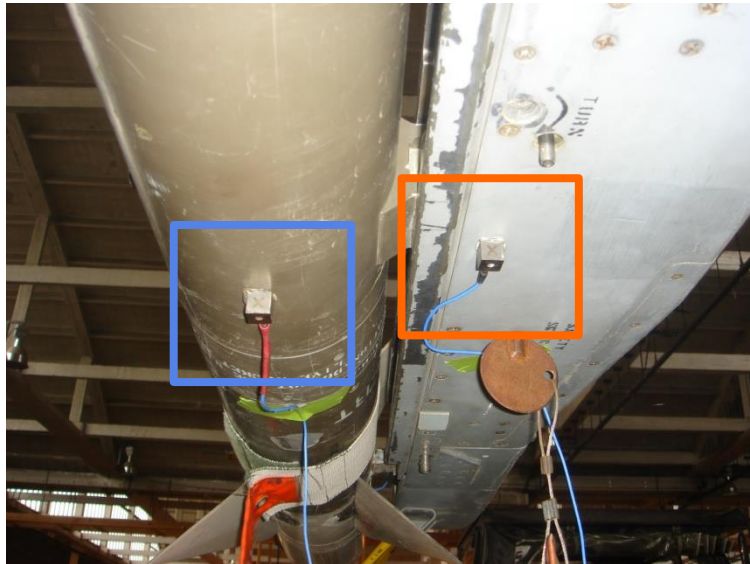
Characterising Nonlinearity
using ASM



Application to a Real-life Structure: F-16 Fighter

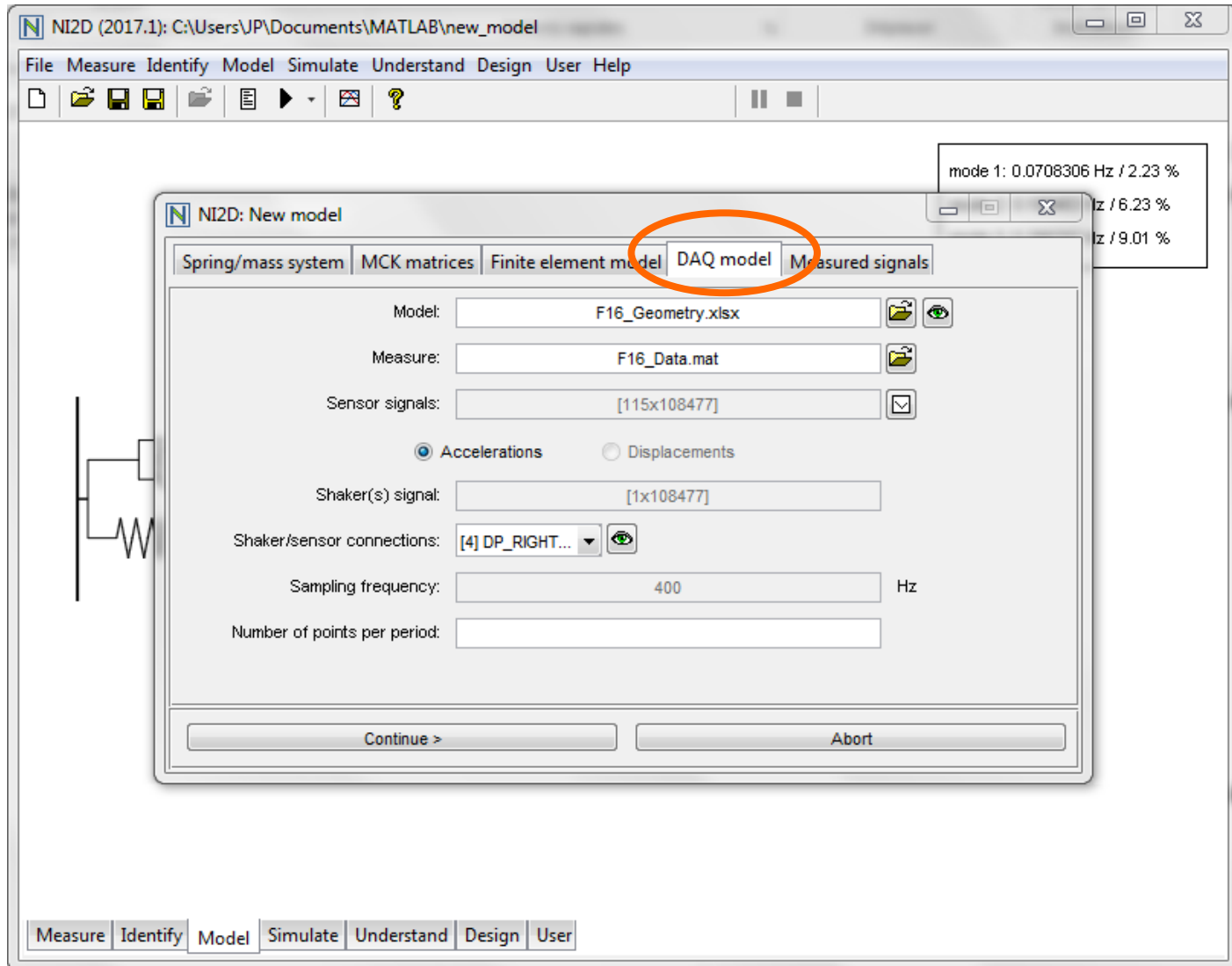


F16 aircraft,
Saffraanberg,
Belgium.

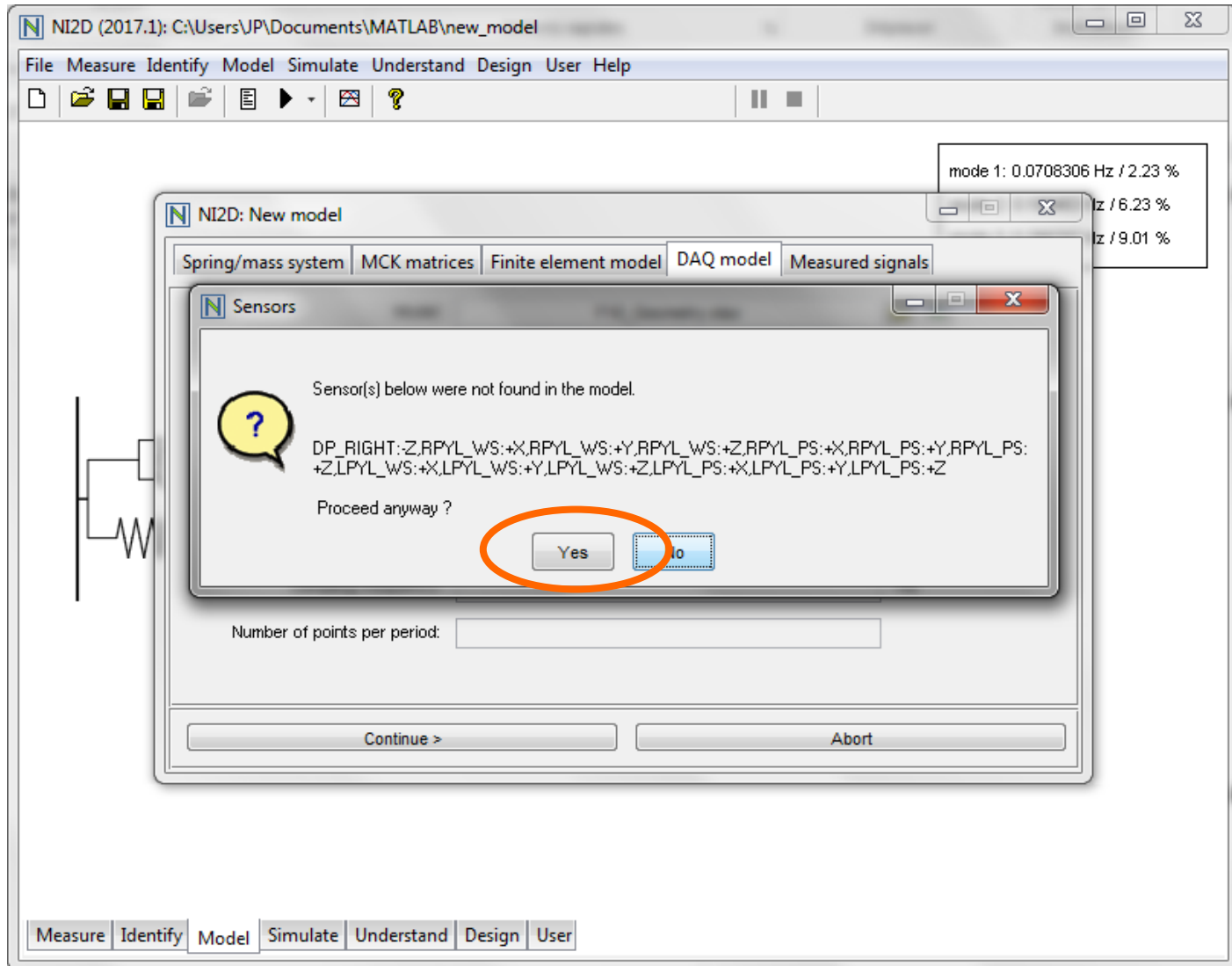


Nonlinear connection
instrumented
on both sides.

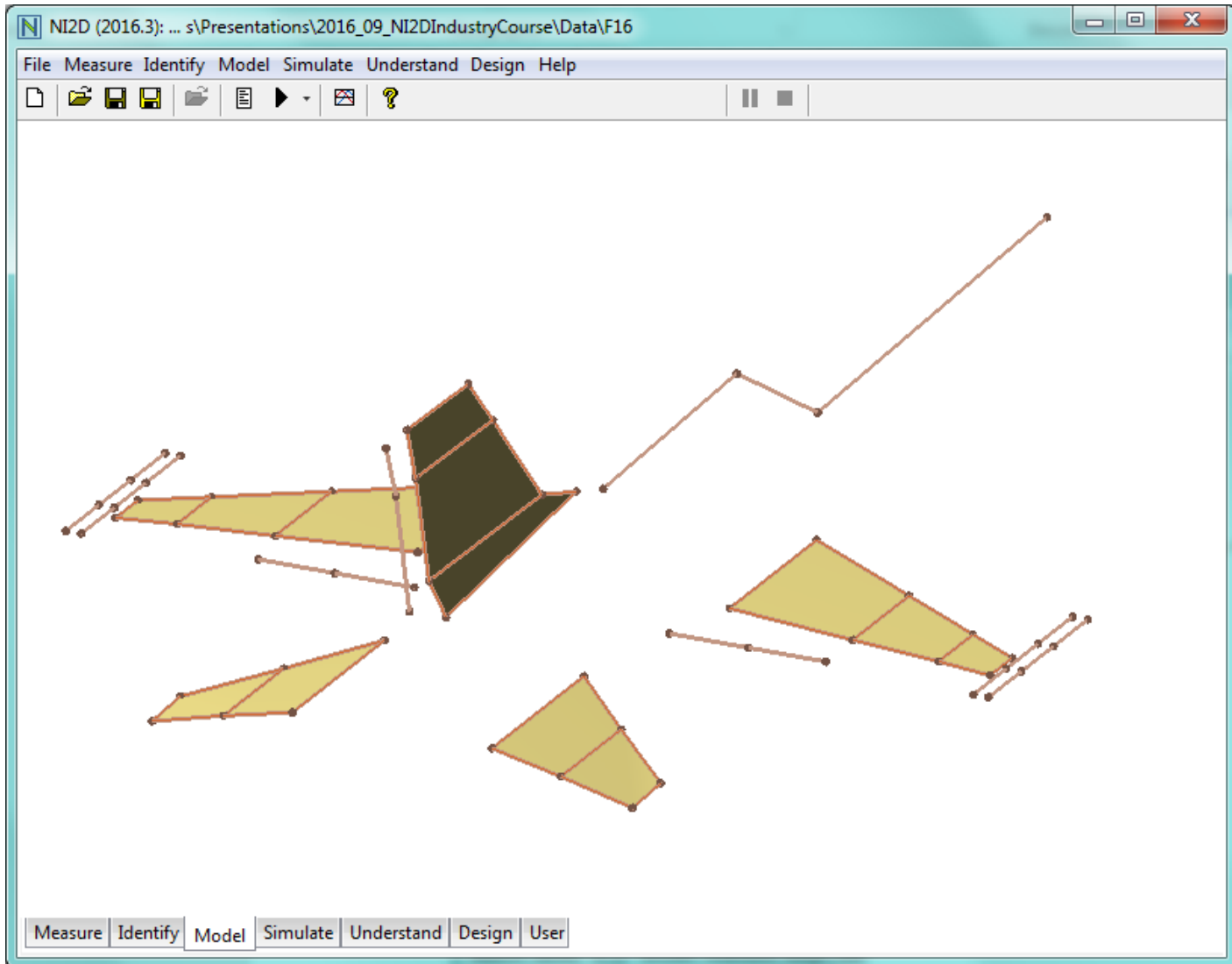
Import LMS Measurement Geometry and Recorded Data



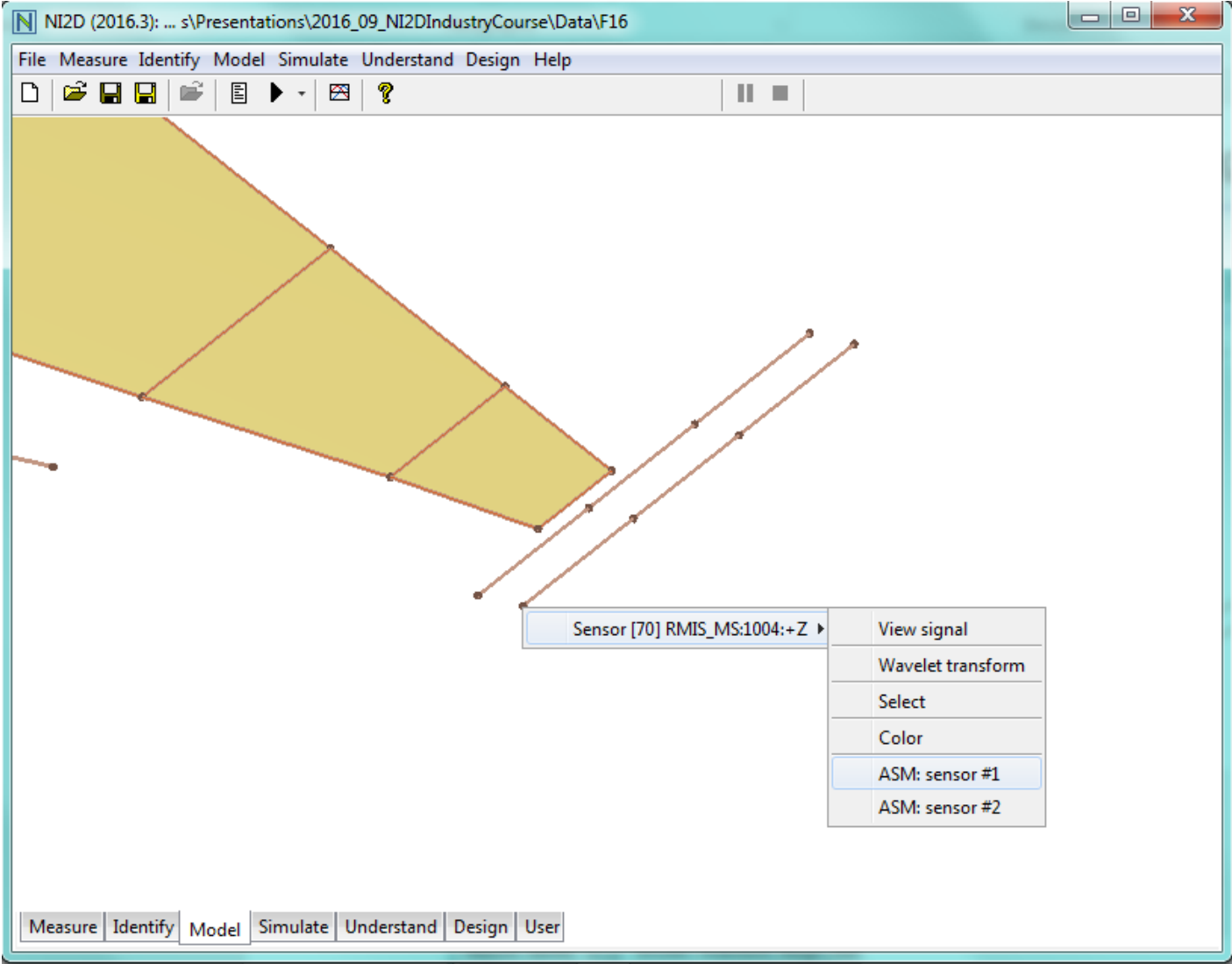
Some Extra Sensors Exist in the Geometry



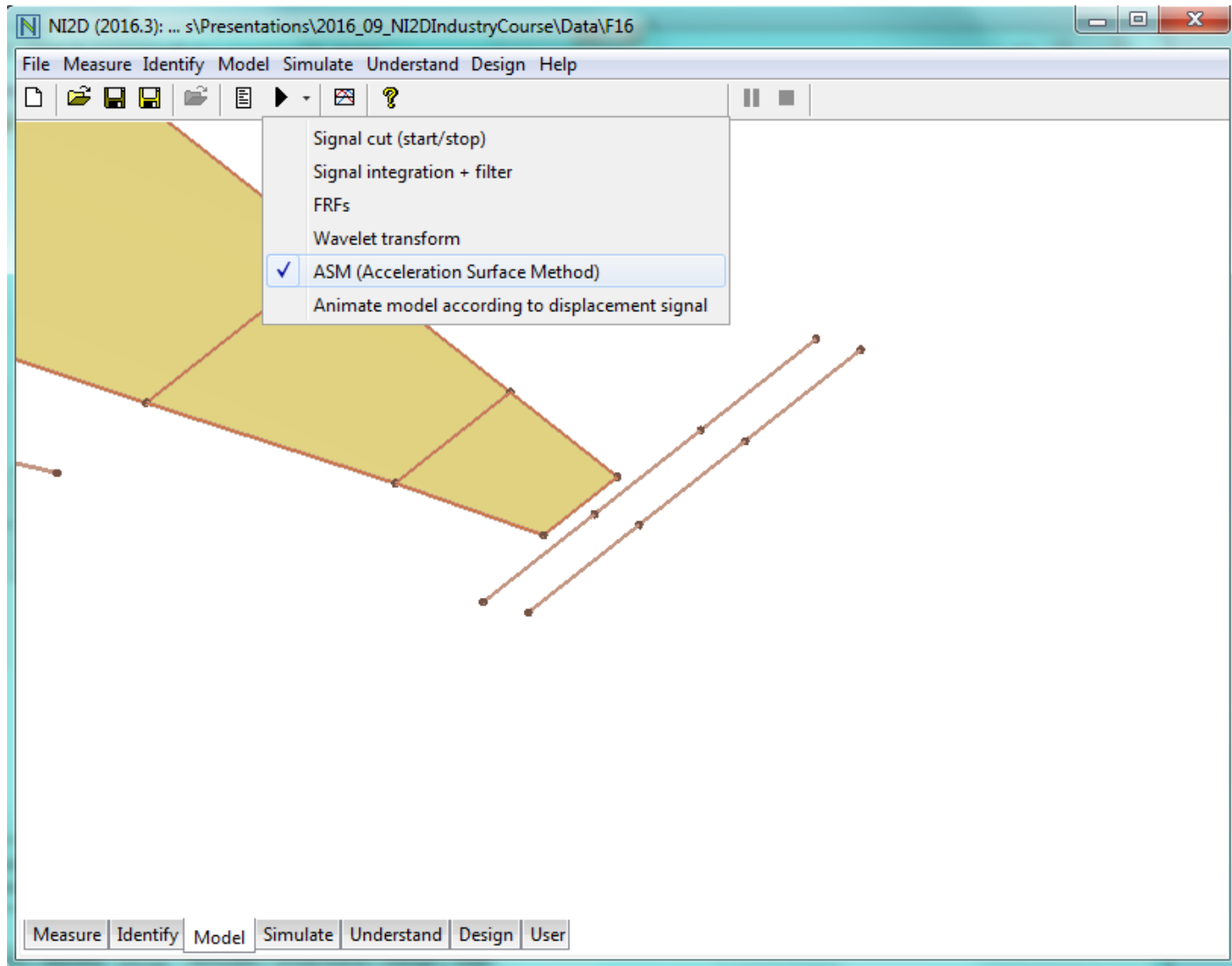
You Visualise the Measurement Geometry of the F-16



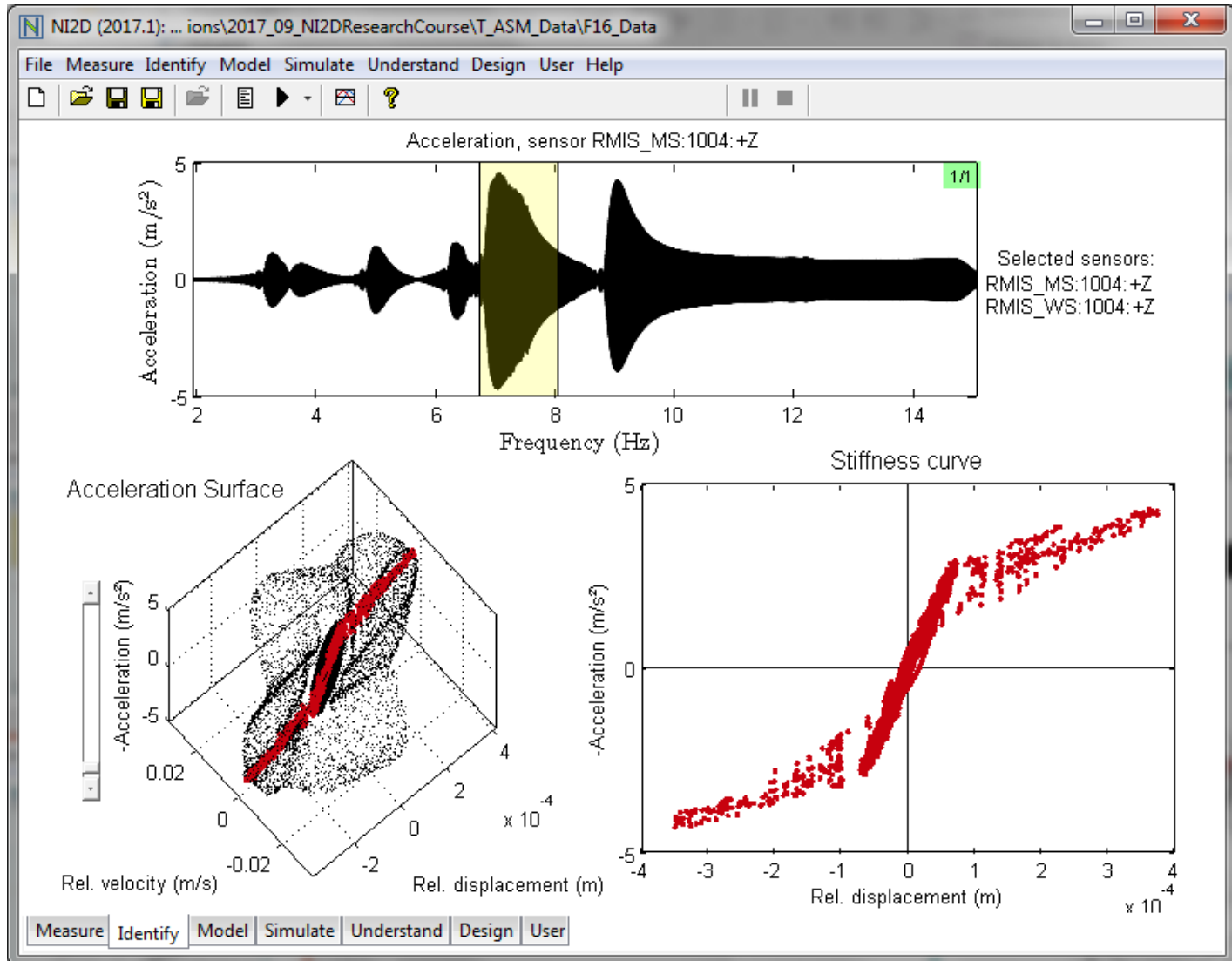
Nonlinearity in the Back Connection of the Right Wing



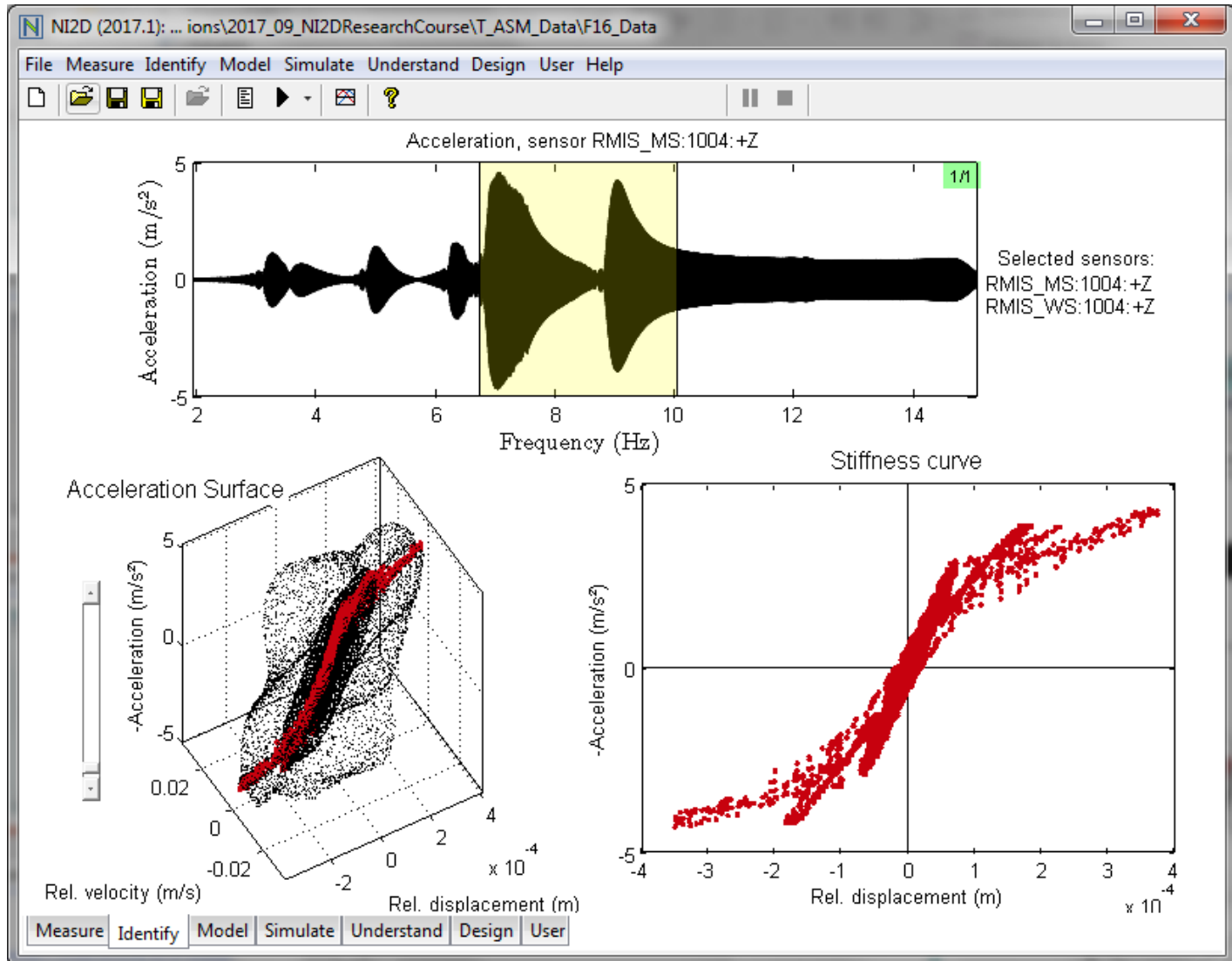
Select ASM in the Solver List



How Do You Interpret the Observed Dynamics?



How Do You Interpret this Result?



Concluding Remarks and Learning Outcomes

Nonlinearities in complex structures can be visualised!

NI2D software provides a user-friendly platform to apply ASM (selection of the modes of interest, zero-velocity slices, ...).

Further Readings

J.P. Noël, L. Renson, G. Kerschen, **Complex dynamics of a nonlinear aerospace structure: Experimental identification and modal interactions**, Journal of Sound and Vibration, 2014.

T. Dossogne, L. Masset, B. Peeters, J.P. Noël, **Nonlinear upgrading and updating of finite element models of aerospace structures using sine-sweep testing**, AIAA Journal, 2018.

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