A new specially designed antenna to be used for inter-comparisons and validation of antenna test facilities is under development in cooperation between DTU and TICRA under a contract from the European Space Agency. The antenna is designed to be extremely thermally and mechanically stable in the range of temperatures 20±5°C under arbitrary orientation in the gravity field. The antenna has a characteristic length of approximately 500mm. And in order to obtain very low measuring error, the allowable deformations of the reflector and feeds are down to 2.5μm.

The antenna is modelled structurally using the commercial finite element package MSC.Patran with MSC.MARC as solver. The solid parts of the antenna are meshed with 10-noded tetrahedral elements, which have quadratic shape functions and the entire model has approximately 325,000 elements. The individual solid part of the antenna is connected via a glued contact formulation in MSC.MARC. Because of the size and the complexity of the model a computer cluster is applied to solve the analyses.

This paper describes the structural solution to meet these extremely strict stability requirements and the structural analyses done in order to verify that they can be met. The paper also discusses the challenges of integrating an aluminum feed cluster with high thermal expansion coefficient in a CFRP support frame with very low thermal expansion coefficient.

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