#1132 : Equivalent Radiated Power (ERP) Optimization for Frequency Response

Product: OptiStruct
Product Version: OptiStruct 13.0 and newer
Partner: -
Computer Hardware: All supported
Computer Operating System: Window
Industry: All
Categories: OptiStruct
Subcategories:

Topic Objective

Using ERP Optimization to reduce dynamic radiation of panel for excitations in frequency response.

Background

OptiStruct can ouput the Equivalent Radiated Power (ERP), and the ERP response can be used for Optimization. ERP is calculated as half the normal velocity squared of each grid, multiplied by the associated area of each grid on the panel.

$$ERP = ERPRLF * \left(\frac{1}{2} ERPC * ERPRHO\right) \sum_{i}^{ngrid} A_i * v_i^2$$

Model Details

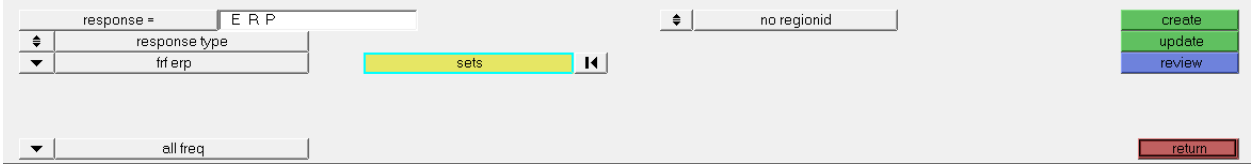
This model is a front cover of catalytic converter in a car exhaust system. The excitation loading is applied at the center of the cover. Loading frequency is from 120.0 to 400Hz with an interval 1.0 Hz.

Step by Step Procedure

You have to have a frequency response model with ERP setup in order to setup optimization in this tutorial.

ERP response setup
Optimization → responses panel

Response type: frf erp
Sets: panel id(PANELG)

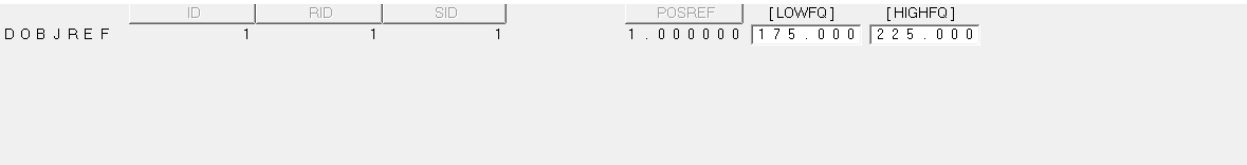


DOBJREF setup for minmax objective function

Optimization → obj reference panel

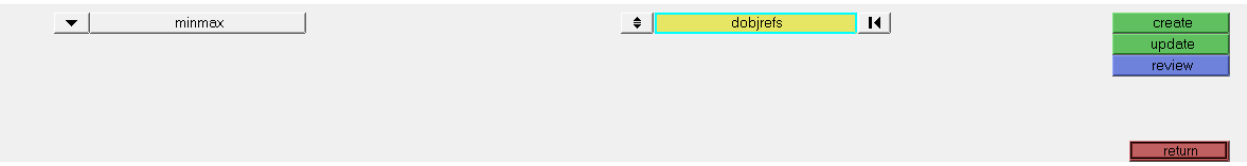
DOBJREF setup for minmax objective function

Card edit a Design Objective Reference as above erp response.
And then edit LOWFQ, HIGHFQ for interesting frequency range to optimize. (175.0 ~ 225 Hz)

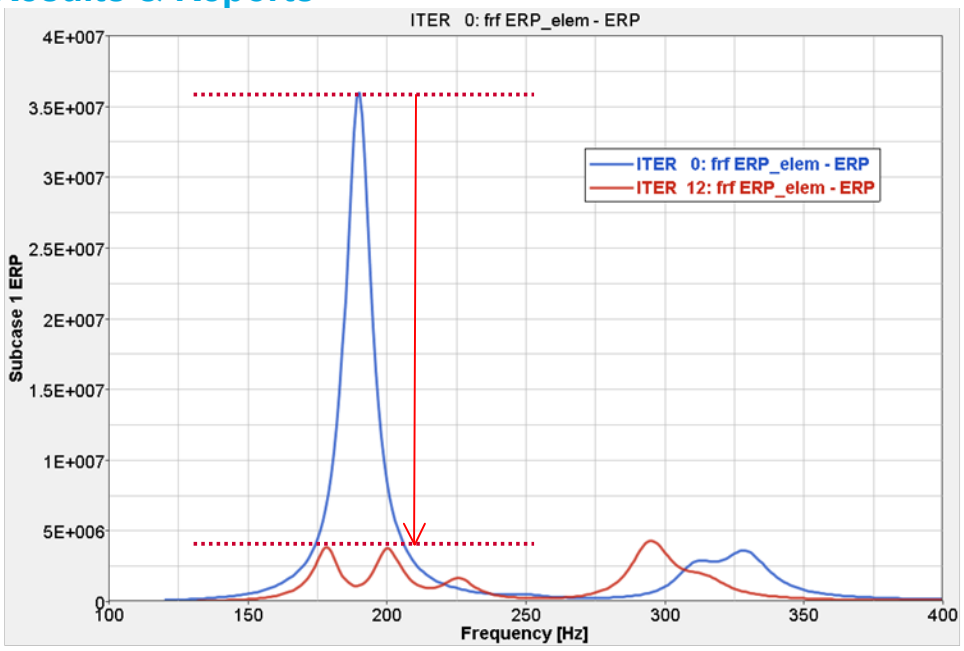


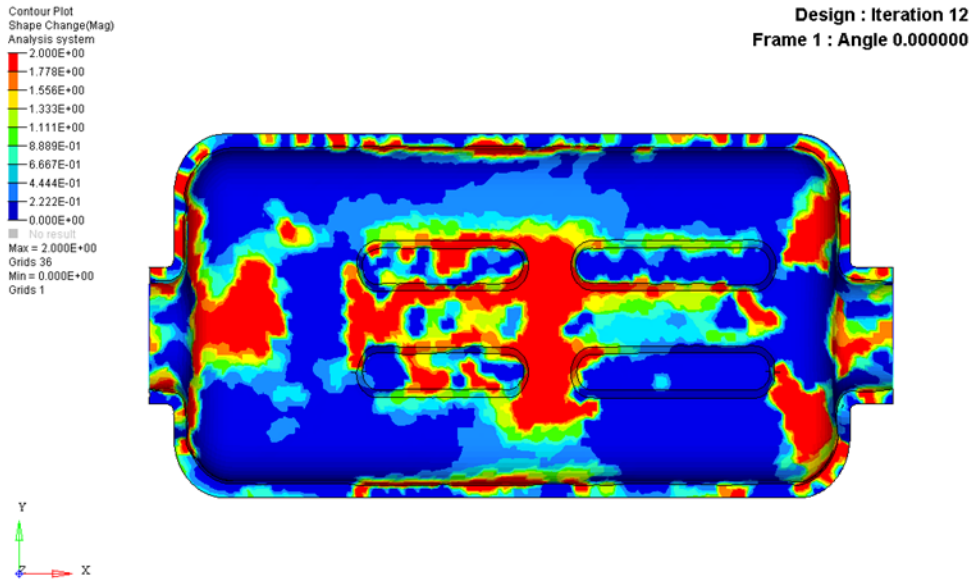
Minmax objective function setup

Optimization → objective panel
Objective function type: minmax, and dobjrefs yellow select DOBJREF id



Results & Reports





Example) OptiStruct Input

```
MINMAX = 1
DTPG                1PSHELL    1
+           10.0       60.0       YES        2.0        NORM                          BOTH
+           BOUNDS    0.0        1.0

DRESP1    1           erp        FRERP                                                 100
DOBJREF             1           1        ALL                  1.0      175.0      225.0
PANELG    100        panel1     ERP         1
```