
HyperWorks Tips + Tricks

GRSM optimization algorithm-HyperStudy

Product: HyperStudy

Product Version: HyperStudy 12.0 or above

Topic Objective

Global Response Surface Method in Hyperstudy.

Topic Details

Is it possible to perform efficient Finite Element Model (FEM) optimization?

Reducing computation time is a challenge in any design exploration context. Since FEM simulations can take from several minutes to several hours, optimization on such models can rapidly become unthinkable.

When many variables are involved, one choice may be to run a DOE and screen out less influential variables. You could take the important variables to build a response surface Fit, and then use it in an optimization to dramatically reduce the solution time. But this method introduces inaccuracies because of the Fit's inherent modeling error. But do you know that efficient solutions exist without introducing these errors and instead working directly on the solver?

In order to answer this question, let's consider the optimization study below that deals with the max cogging torque reduction in a brushless DC permanent magnet motor simulated by Flux 2D.

Let us compare the optimum results and computation time obtained with 2 global search methods: genetic algorithm and HyperStudy's own GRSM. As we can observe on the graph below, similar results have been obtained but the computation time is quite different: 24 minutes for GRSM and more than 6 hours for GA.

For this example, GRSM is decidedly the more efficient optimization algorithm.

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