CAD/CAE integrated reanalysis assisted optimization system for vehicle design

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Abstract

In this study, a CAD/CAE integrated reanalysis assisted optimization system is developed. Compared with popular isogeometric analysis (Hughes, et.al, 2005), the CAD model used in this system is based on triangle elements. To smooth the surface and improve the efficiency of triangle element based simulation system, subdivision surface and weakened weak form (W2) using the generalized gradient smoothing technique proposed by Liu (G.R.Liu, 2010a,b) are integrated. Commonly, the integrated system can be used for optimization directly. However, most of engineers like adjusting design by their experience and “online” analysis results. Therefore, the major distinctive characteristic of this analysis system is “Seen is solution” and thereby called SIS system. The designer only needs to input the CAD file, define constraints, modify the design and check analysis results again and again till design satisfy the requirement. The CAD and FE model do not need to be reconstructed and remeshed during entire design cycle. The user can adjust structure of product based on current model instead of redrawing the CAD again. Therefore, the design cycle can be shortened significantly. Now, the SIS system has been applied to vehicle design and can also be integrated with popular optimization methods seamlessly.

References