USE OF META-CODES AND WEBAPPS TO DEMOCRITIZE HIGH-END STRUCTURAL ANALYSIS AND OPTIMIZATION

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ABSTRACT

Advances in CAD/CAE as well as Moore's law for compute capability have enabled unprecedented realistic simulation of complex physical phenomena. FEA (Finite Element Analysis) structural analysis demonstrates this advancement well with exponential increase in model size and speed of execution. Whereas 1000 elements was typical in the early days of FEA, today 1M+ elements is not unusual. One thing that has remained consistent is that FEA requires a full time specialist and, if quality results are desired, a specialist with proven experience. Few companies have resources for full time specialists. Further, specialists are often bogged down with repetitive work to maintain an already established method or process.

In this paper we will show examples from the Intel®, illustrating complexities encountered in structural analysis process and then look at two significant advances that have enabled overcoming those complexities.

First, we will look at new technology which might be called Meta-code generalizations, meaning they envelope the various codes from various manufacturers to enable high level system modelling that is able to seamlessly adapt to significant changes in geometric, boundary condition, and loading while maintaining the original intent of the specialist. Further, we will discuss the ease with which this enables numerical optimization and standardized parameter studies, by not just the specialists, but also by non-specialists

Second, we will look at the power of simplifying these meta-code integrated systems by using a “basic” webapp (SimApp) interface. This opens the door to non-specialists to make changes to a design without specialist involvement. Part of this is the discussion of creating concise evaluation metrics and controlling the input ranges to ensure “safe” use of the webapp or SimApp.

Finally, the automation of structural analysis has also created a vehicle for enforcing standardized processes, as well as completely documenting it for use by all downstream specialists and non-specialists, within a global organization.