TOWARDS A STANDARD FOR FINITE ELEMENT DATA EXCHANGE USING XML

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It is well known that there is not a standard file format for the exchange of data amongst the variety of finite element packages currently in the market (see, for example, [1]). Also, it is of common knowledge the difficulty of working with many different applications to solve or model a particular problem. The various finite element analysis codes have different characteristics, methodological approaches, theories and, in most of the cases, different elements. Therefore, it is normal to solve a given problem in distinct finite element programs in order to validate or to complement the obtained results. In these cases, the duplication of data input can be an additional complication. There are not enough facilities or interface programs in these systems to allow the data interchange between them.

A standard format could improve the analysis process since a data output file could be used as a data input for a different system, regardless of the source and the target, consequently minimising errors while exporting data between different systems. Some work has been done in an attempt to establish such a standard [2, 3]. On the other side, the neutral data format creation for data exchange is gradually becoming much easier with using XML – Extensible Markup Language. The XML proposal focuses not only on document or data structure, but also on its validation through the creation of vocabularies known as XML Schemas. These schemas are emerging as a standard for applications and vocabulary creation in the XML universe and can be used to ensure the data correction and integrity, as well its structure. They improve the use of the XML technology in a plethora of systems and applications.

This work proposes the establishment of a XML Schema to describe a neutral and structured standard for the exchange of data in finite element analyses, namely FEML (Finite Element Markup Language). This so-called vocabulary includes, in addition to the element library itself, material properties, boundary conditions, load cases, all the analysis control parameters, and so forth. In order to validate the XML Schema, interface programs were developed. These programs simulate data export and import operations between the proprietary format and the neutral one, and indicate that the proposed schema is feasible. The use of the FEML, in conjunction with easy implementations of input and output interfaces for the different systems, can guarantee a faster and reliable data exchange between different finite element software. The FEML is on its initial stage, and is still restricted to a specific structural analysis finite element program. Therefore, it will be necessary further research in order to accomplish a complete application in the domain of the problem.

References

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