ABSTRACT:

Modern manufacturing enterprise requires adaptable, trustable, and affordable solutions in model-based engineering and platform-based engineering. Limited or poor geometric interoperability of the software supporting engineering applications within the product life cycle now dominates practical considerations in deploying computational technologies and solutions.

I will argue that many computational problems in engineering may be formulated in terms of standard geometric queries that are supported by any reasonable geometric representation, thus liberating engineering applications from assumptions of and dependence on any particular geometric system or representation. This in turn leads to solution procedures involving geometric and functional sampling and composition steps, used in conjunction with standard numerical techniques. I will demonstrate that systematic application of these principles yields practical computational solutions to two unrelated challenging problems: fully automated (in-situ) finite element analysis and rapid exploration of six-dimensional configuration space.

* Portions of this talk are based on joint work with Chris Hoffmann (Purdue) and Vijay Srinivasan (NIST)
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