Application of Graph Based Problem Formulation to Gradient Based Optimization Of Very Large Design Spaces In OpenMDAO

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I. Motivation

- Accessiblity to very large problems with 1000's to 10,000's of design variables
- Improved computational efficiency
- Problem formulation flexibility
- Solution strategy flexibility

II. Challenges

- Heterogenous components: Not just in the multi-disciplinary sense, but also in the computation cost and complexity sense.
- Explicit vs Implicit Components
- Separation of problem formulation and solution strategy: Monolithic mathematical description of the problem that is automatically decomposed into a more solvable form by the framework
- Increate code resue and modularity

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