

Industrial and Systems Engineering Seminar

Quo Vadis MINLP?

Wednesday, September 10

3:15 PM – Refreshments before the Seminar

3:30 PM – Graduate Seminar

Mechanical Engineering Room 4125 A & B



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MINLP (Mixed-integer nonlinear programming)/NDO (Nonlinear discrete optimization)/GO (Global optimization) is the mother of all deterministic optimization paradigms. The obvious modeling power of such a paradigm is coupled with extreme intractability, in general. So we naturally refine the theory, by establishing “broad” tractable cases, and on the other side, establishing intractability for “narrow” classes of problems. In between, and informed by both sides, fits general-purpose and problem-specific software development ---aimed at small-to-moderate-size instances of models having applied interest but apparently naturally falling on the intractable side of the theory.

I will describe a current effort to push some of this forward, in the context of the EST (Euclidean Steiner Tree) problem. In doing so, we will see how MINLP might or might not help with the EST problem, and conversely.

This is joint work with Claudia D’Ambrosio (Ecole Polytechnique, FR) and Marcia Fampa (UFRJ, BR).

Bio: Jon’s research focus is on nonlinear discrete optimization (NDO). Many practical problems have physical aspects which are naturally modeled through smooth nonlinear functions, as well as design aspects which are often modeled with discrete variables. Research in NDO seeks to marry diverse techniques from classical areas of optimization, for example methods for smooth nonlinear optimization and methods for integer linear programming, with the idea of successfully attacking natural NDO models for practical engineering problems.