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Improving Mixed Integer Linear Optimization Formulations for the Unit Commitment Problem

The unit commitment problem is a fundamental problem in the operation of electric power systems. We present two ways to improve mixed-integer linear optimization formulations of the unit commitment problem. The first is a new class of facet-defining inequalities for the convex hull of feasible generator schedules. The second is a modified orbital branching technique that exploits the symmetry created by identical generators. Computational results show that these approaches can significantly reduce overall solution times for realistic instances of unit commitment. This is joint work with James Ostrowski (University of Tennessee, Knoxville, USA) and Anthony Vannelli (University of Guelph, Canada).