

Tight and compact MILP formulation for the thermal unit commitment problem

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Abstract-

This paper presents a Mixed-Integer Linear Programming (MILP) reformulation of the thermal Unit Commitment (UC) problem. The proposed formulation is simultaneously tight and compact. The tighter characteristic reduces the search space and the more compact characteristic increases the searching speed with which solvers explore that reduced space. Therefore, as a natural consequence, the proposed formulation significantly reduces the computational burden in comparison with analogous MILP-based UC formulations. We provide computational results comparing the proposed formulation with two others which are recognized as computationally efficient in the literature. The experiments were carried out on 40 different power system mixes and sizes, running from 28 to 1870 generating units.

Index Terms- Mixed-integer linear programming, strong lower bounds, thermal units, unit commitment.

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