Online Appendix

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This is the online appendix of our submitted manuscript “Feasibility in Multistage Robust Dispatch with Renewables: A Recursive Characterization and Scalable Approximation”. Reviewers/researchers are requested to read the full text of both the manuscript and this appendix for better understanding.

In a backward recursion, given a polyhedron and a polyhedral uncertainty set , we need to compute where

The submitted manuscript has provided the solution when the uncertainty set is low-dimensional, whose vertices can be enumerated. This appendix focuses on the case where vertex enumeration is intractable.

To this end, define

Obviously, we have

is the orthogonal projection of where

By denoting , condition is equivalent to

Due to the difficulty in computing large-scale polyhedral projection, the idea is to approximate from within by an affine transformation . Polyhedron is a template, diagonal matrix is for stretch, and column vector is for translation. Please refer to the submitted manuscript for details.

To find the maximal inner approximation of , we resort to the following optimization problem:

Problem (5) is equivalent to

By **Claim 1** in the submitted manuscript, problem (6) is further equivalent to

where is a diagonal matrix built with , and is a vector that depends on . Please refer to the submitted manuscript for details.

Apparently, problem is a two-stage robust optimization and shares the same mathematical structure with the problem (25) in the submitted manuscript. Hence, the proposed solution procedure in **Algorithm 1,** which consists of a master problem and a sub-problem, is applicable to problem .

In conclusion, this online appendix reveals that when the vertices of uncertainty set cannot be enumerated, the proposed method still works with minor amendments to the model.