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Stochastic dual dynamic programming for log-linear autoregressive uncertainty in the right-hand side

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We consider the generation of cuts in stochastic dual dynamic programming (SDDP) for multistage stochastic linear programming problems with stagewise dependent uncertainty in the right-hand side described by log-linear (or geometric) autoregressive processes. We show that it is possible to develop tractable closed-form cut formulas in this case. The cuts are linear in all decision variables, and thus can be directly incorporated into the subproblems in SDDP without compromising their linearity. If solvers do not allow for this, our formulas can be used to adapt the intercept of a given cut to a scenario at hand in a computationally tractable way. Our findings are supported by an extensive computational study of a hydrothermal scheduling problem.

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