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# Welfare-maximizing transmission capacity expansion under uncertainty

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**Abstract-**

**We apply the JuDGE optimization package to a multistage stochastic leader–follower model that determines a transmission capacity expansion plan to maximize expected social welfare of consumers and producers who act as Cournot oligopolists in each time period. The problem is formulated as a large-scale mixed integer programme and applied to a 5-bus instance over scenario trees of varying size. The computational effort required by JuDGE is compared with solving the deterministic equivalent mixed integer programme using a state-of-the-art integer programming package.**

**Index Terms- stochastic optimization, JuDGE, transmission expansion planning, bilevel programming**



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