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The Moment/SOS hierarchy provides a way to compute the global minimizers of polynomial problems, at the cost of solving a sequence of increasingly large semidefinite programs. We consider large-scale problems, for which interior point methods are no longer applicable to the SDPs.

We propose an algorithm that combines a first-order method on the SDP relaxation, and a second-order method on the polynomial problem. Interestingly, the switch between first and second-order method is based on a quantitative criterion, which ensures Newton's method converges quadratically from its first iteration. We apply this methodology to obtain global minimizers on optimal power flow problems of nation-wide scale.

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