

Solving Nonlinear Absolute Value Equations

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In this work, we show that several problems naturally represented as Nonlinear Absolute Value Equations (NAVE) can be reformulated as Nonlinear Complementarity Problems (NCP) and efficiently solved using smoothing regularization techniques under mild assumptions. As far as we know, this is the first numerical approach that directly deals with NAVE. We also identify a technical assumption commonly utilized in smoothing techniques and prove its equivalence to a classical Łojasiewicz inequality at infinity, validating its non-restrictive nature. Furthermore, we extend established error estimates for NCP solvers to derive error bounds for NAVE problems under weaker assumptions. We illustrate the effectiveness of our approach through applications including asymmetric ridge optimization and nonlinear ordinary differential equations.