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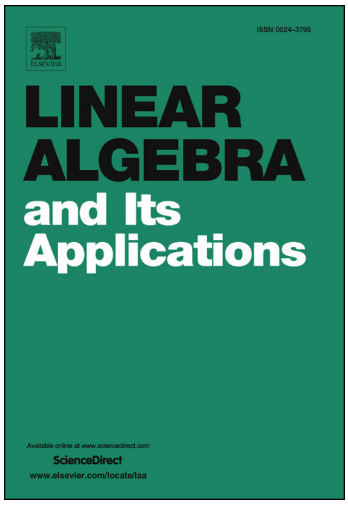

On solving large-scale limited-memory quasi-Newton equations

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On solving large-scale limited-memory quasi-Newton equations

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Abstract

We consider the problem of solving linear systems of equations arising with limited-memory members of the restricted Broyden class of updates and the symmetric rank-one (SR1) update. In this paper, we propose a new approach based on a practical implementation of the compact representation for the inverse of these limited-memory matrices. Numerical results suggest that the proposed method compares favorably in speed and accuracy to other algorithms and is competitive with several update-specific methods available to only a few members of the Broyden class of updates. Using the proposed approach has an additional benefit: The condition number of the system matrix can be computed efficiently.

Keywords: Limited-memory quasi-Newton methods, compact representation, Broyden class of updates, symmetric rank-one update, Broyden-Fletcher-Goldfarb-Shanno update, Davidon-Fletcher-Powell update, Sherman-Morrison-Woodbury formula

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