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Set Reduction In Nonlinear Equations

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In this paper, an idea to solve nonlinear equations is presented. During the solution of any problem with Newton's Method, it might happen that some of the unknowns satisfy the convergence criteria where the others fail. The convergence happens only when all variables reach to the convergence limit. A method to reduce the dimension of the overall system by excluding some of the unknowns that satisfy an intermediate tolerance is introduced. In this approach, a smaller system is solved in less amount of time and already established local solutions are preserved and kept as constants while the other variables that belong to the "set" will be relaxed. To realize the idea, an algorithm is given that utilizes applications of pointers to reduce and evaluate the sets. Matrix-free Newton-Krylov Techniques are used on a test problem and it is shown that proposed idea improves the overall convergence.