1147-65-457   **Matthew G Knepley*** (`knepley@buffalo.edu`), Computer Science and Engineering, Box
                602000, Buffalo, NY 14260-2500. *Thoughts on Composing Nonlinear Solvers.*

We present, in analogy with the linear preconditioning operation, a framework for the composition of nonlinear solvers, which we call nonlinear preconditioning, in order to accelerate convergence and improve solver performance. A central problem for this operation is that no rules of thumb exist for choosing the operations or composition strategy, and theory has been an unreliable guide. We explore a possible alternative, the nondiscrete induction of Ptak, which could allow us to understand the short time behavior of composed iterations. (Received January 24, 2019)