Title: Globally convergent algorithms for finding zeros of systems of non-linear biochemical reaction equations.

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Abstract: We introduce a new class of mappings, called duplomonotone, which is strictly broader than the class of monotone mappings. We study some of the main properties of duplomonotone functions and provide various examples, including nonlinear duplomonotone functions arising from the study of systems of biochemical reactions. Finally, we present three variations of a derivative-free line search algorithm for finding zeros of systems of duplomonotone equations, and we prove their linear convergence to a zero of the function.