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## **Fast Convergence of Generalized Forward-Backward Algorithms for Structured Monotone Inclusions**

We develop rapidly convergent forward-backward algorithms for computing zeroes of the sum of finitely many maximally monotone operators. A modification of the classical forward-backward method for two general operators is first considered, by incorporating an inertial term (close to the acceleration techniques introduced by Nesterov), a constant relaxation factor and a correction term. In a Hilbert space setting, we prove the weak convergence to equilibria of the iterates  $(x_n)$ , with worst-case rates of  $o(n^{-1})$  in terms of both the discrete velocity and the fixed point residual, instead of the classical rates of  $\mathcal{O}(n^{-1/2})$  established so far for related algorithms. Our procedure is then adapted to more general monotone inclusions and a fast primal-dual algorithm is proposed for solving convex-concave saddle point problems.

**Keywords:** Nesterov-type algorithm, inertial-type algorithm, global rate of convergence, fast first-order method, relaxation factors, correction term, accelerated proximal algorithm, fixed point problem.

**MSC:** 90C25, 90C30, 90C60, 68Q25, 49M25.