

Strong and Fast convergences of primal-dual dynamical systems with time scaling and Tikhonov regularization coefficients

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Abstract:

In a Hilbertian setting, we try to strongly reach the optimal solution of a differentiable convex minimization problem under linear equality constraints. To solve this convex optimization problem under linear equality constraints, we propose primal-dual dynamical systems adapted to the associated Lagrangian function. These primal-dual dynamical systems are presented by adding a timescale coefficient to the gradient factor and a Tikhonov regularization term. The asymptotic behavior of these dynamical systems is then investigated. First, we obtain a strong convergence of the trajectories of the solutions of these systems towards the minimum norm solution without strong convexity of the objective function. In addition, a better rate of convergence to zero of the values, velocity and constraints is achieved. This will be justified by numerical examples where these previously predicted convergence rates will be similar.