1137-90-208 **James V Burke*** (jvburke@uw.edu), **Aleksandr Aravkin**, **Dmitriy Drusvyatskiy**, **Michael P Friedlender** and **Kellie MacPhee**. *Foundations of gauge and perspective duality.*

Common numerical methods for constrained convex optimization are predicated on efficiently computing nearest points to the feasible region. The presence of a design matrix in the constraints yields feasible regions with more complex geometries. When the functional components are gauges, there is an equivalent optimization problem—the gauge dual—where the matrix appears only in the objective function and the corresponding feasible region is easy to project onto. We discuss the foundations of gauge duality and show that the paradigm arises from an elementary perturbation perspective. This puts gauge and Fenchel-Rockafellar duality on an equal footing, explain gauge dual variables as sensitivity measures, and show how to recover primal solutions from those of the gauge dual. (Received February 04, 2018)