
WALAA MOURSI, University of Waterloo

Further notions of monotonicity and corresponding properties of resolvents and reflected resolvents

The correspondence between the monotonicity of a (possibly) set-valued operator and the firm nonexpansiveness of its resolvent is a key ingredient in the convergence analysis of many optimization algorithms. Firmly nonexpansive operators form a proper subclass of the more general - but still pleasant from an algorithmic perspective - class of averaged operators. In this talk, we introduce the notion of conically nonexpansive operators which generalize nonexpansive mappings. We characterize averaged operators as being resolvents of comonotone operators under appropriate scaling. As a consequence, we characterize the proximal point mappings associated with hypoconvex functions as cocoercive operators, or equivalently; as displacement mappings of conically nonexpansive operators. Several examples illustrate our analysis and demonstrate the tightness of our results.