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Harmonic Sum and Duality

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Abstract: We consider an operation on subsets of a topological vector space which is closely related to what has been called the inverse addition by R.T. Rockafellar. Applied to closed convex sets, it appears as the operation corresponding to the addition under polarity. However, our study is not limited to the convex case. Crucial tools for it are the gauges one can associate with a subset. We stress the role played by asymptotic cones in such a context. We present an application to the calculus of conjugate functions for one of the most fruitful dualities for quasiconvex problems. We also present an extension of the well-known rule for the computation of the normal cone to a convex set defined by a convex inequality.

Keywords: conjugate function, convex sets, duality, gauge, harmonic sum, inverse sum, normal cone, shady set, star-shaped set

Classification (MSC2000): 52A05, 52A30, 26B25, 90C25

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