

Bounded Linear Regularity, Strong CHIP, and CHIP are Distinct Properties

Bauschke, Heinz H.; Borwein, Jonathan M.; Tseng, Paul

Dept. of Mathematics and Statistics Okanagan University College Kelowna BC, V1V 1V7 Canada
Centre for Experimental and Constructive Mathematics Dept. of Mathematics Simon Fraser University Burnaby BC,
V5A 1S6 Canada
Dept. of Mathematics University of Washington Seattle, WA 98195-4350 U.S.A.



Abstract: Bounded linear regularity, the strong conical hull intersection property (strong CHIP), and the conical hull intersection property (CHIP) are properties of a collection of finitely many closed convex intersecting sets in Euclidean space. It was shown recently that these properties are fundamental in several branches of convex optimization, including convex feasibility problems, error bounds, Fenchel duality, and constrained approximation. It was known that regularity implies strong CHIP, which in turn implies CHIP; moreover, the three properties always hold for *subspaces*. The question whether or not converse implications are true for general convex sets was open.
We show that - even for *convex cones* - the converse implications need not hold by constructing counter-examples in \mathbb{R}^4 .

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