GEOMETRY OF ORLICZ AND BANACH SPACES, UNIFORM HOMEOMORPHISMS, AND VAĬNBERG–BRÈGMAN PROJECTIONS

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While the geometric properties of Orlicz spaces are characterised 'internally' by the properties of Orlicz function, the geometric properties of Banach spaces are characterised 'externally' by the properties of the Asplund function (defined by an integral of a strictly increasing ϕ-function). The Young–Fenchel inequality for the Asplund function defines the Vaĭnberg–Brègman information. For reflexive Banach spaces, the constrained minimisers of the latter quantity are generally better behaved than metric projections (they coincide for Hilbert spaces), and, as such, they have been a subject of an intense convex analytic research in the last three decades (by Al'ber, Borwein, Reich, and others). In order to extend these results to nonreflexive (commutative and noncommutative) L_1 spaces, we consider nonlinear homeomorphisms between reflexive and nonreflexive spaces (such as Mazur, Kaczmarz, or Lozanovskiĭ maps), obtaining several new results at the intersection of the above frameworks, in commutative and noncommutative settings. Since the geometry of Orlicz spaces with p-Amemiya norms has been well investigated, we use them as a source of examples. In return, we point out to few open questions in this field.