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Is there a p-version of the Minkowski difference? A survey

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In this talk we introduce a notion of p-difference of convex bodies as a substraction counterpart of the well-known p-sum, for $p \geq 1$. We show several properties of this p-difference, and define the corresponding notions of p-(inner) parallel bodies and p-kernel. We prove an analog of the concavity of the family of classical parallel bodies for the p-parallel ones, as well as the continuity of this new family, in its definition parameter. Further results on inner parallel bodies are extended to p-inner ones. For instance, we show that tangential bodies are characterized as the only convex bodies all whose p-inner parallel bodies are homothetic copies of them.

Quermassintegrals are functionals associated to a convex body K which appear when computing the volume of the Minkowski addition of K and a ball. We investigate the differentiability of the quermassintegrals with respect to the one-parameter family of p-parallel bodies. As in the classical case, we obtain that the volume is always differentiable. Although there is no polynomial expression for the p-sum, the other quermassintegrals are differentiable for positive values of the parameter too.

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