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Journal of Convex Analysis 21 (2014) 925–950

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Asymptotic Order of the Parallel Volume Difference in Minkowski Spaces

We investigate the asymptotic behavior of the parallel volume of fixed non-convex bodies in Minkowski spaces as the distance r tends to infinity. We will show that the difference of the parallel volume of the convex hull of a body and the parallel volume of the body itself, which is called parallel volume difference, can at most have order r^{d-2} in a d -dimensional Minkowski space. Then we will show that in certain Minkowski spaces (and in particular in Euclidean spaces) this difference can at most have order r^{d-3} . We will characterize the 2-dimensional Minkowski spaces in which the parallel volume difference has always at most order r^{-1} . Finally we present applications concerning Brownian paths and Boolean models.

Keywords: Convex geometry, parallel volume, non-convex body, random body.

MSC: 52A20, 52A21, 52A22, 52A38