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Addendum to: Crofton formulae and geodesic distance in hyperbolic spaces

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In Remark 2.6 of [1] we asked whether one could find a direct proof of the fact that the distance function on quaternionic hyperbolic space is a kernel of negative type. This is indeed possible, by considering the following 24 points. For $\sigma \in \{+1, -1\}$ and $\epsilon \in \{\pm i, \pm j, \pm k\}$, let $x_\epsilon^\sigma = (3, 2\sigma + 2\epsilon, 0)$ and $y_\epsilon^\sigma = (3, 0, 2\sigma + 2\epsilon)$. Direct calculation shows that

$$\sum d(x_\epsilon^\sigma, x_\delta^\rho) + \sum d(y_\epsilon^\sigma, y_\delta^\rho) - \sum d(x_\epsilon^\sigma, y_\delta^\rho) = 417.03 - 415.77 > 0.$$

This shows that the condition for negative type fails with the number $+1$ being associated to the x_ϵ^σ and -1 to the y_ϵ^σ.

We take the opportunity to point out that there is a misprint in Remark 2.6: the word "Hilbert" should be replaced by the word "hyperbolic."

References

[1] Robertson, G., *Crofton formulae and geodesic distance in hyperbolic spaces*, Journal of Lie Theory **8** (1998), 163–172.

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