ADDENDUM FOR “QUANTITATIVE OSCILLATION ESTIMATES FOR ALMOST-UMBILICAL CLOSED HYPERSURFACES IN EUCLIDEAN SPACE”

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We want to make an additional comment on [2, Thm. 1.1]. Unfortunately only after the publication of this paper we learned about the paper [1], which implies our result using standard results and a simple calculation. However, the methods of the proofs differ tremendously. In [1] the author uses projection methods onto 3-dimensional subspaces and standard pinching results for surfaces, whereas we use estimates in terms of $L^p$ pinchings.

In fact, with our method it is also possible to prove closeness estimates in terms of $\|A\|_p$, namely that for $p > n$ and a closed and strictly convex hypersurface with $|M| = 1$ we find constants $\beta = \beta(p,n)$ and $\epsilon_0 = \epsilon_0(n,p,\|A\|_p)$, such that if $\epsilon < \epsilon_0$ and

$$\|A\|_p \leq \|H\|_p \epsilon,$$

then

$$\text{dist}(M, S_R) \leq c \epsilon^{\beta}.$$

Here one also has to be careful with the proposed exponent $\beta = \frac{1}{2+\alpha}$. $\beta$ will in general become smaller when $p$ gets closer to $n$. If we are not dealing with the case $p = \infty$, in which we would even obtain $\beta = 1$ due to [1], we are not aware how $\beta$ behaves in dependence of $p > n$.

References

[1] Kurt Leichtweiß, Nearly umbilical ovaloids in the n-space are close to spheres, Result. Math. 36 (1999), no. 1-2, 102–109.

[2] Julian Scheuer, Quantitative oscillation estimates for almost-umbilical closed hypersurfaces in Euclidean space, Bull. Aust. Math. Soc. 92 (2015), no. 1, 133–144.