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ADDENDUM TO "A PERTURBATION RESULT IN PRESCRIBING SCALAR CURVATURE ON S^n"

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We have recently been informed by Yanyan Li that there is some ambiguity in the notion of nondegeneracy introduced in our article [CY]. The purpose of this note is to clarify the ambiguity. The argument of [CY] actually establishes the following:

THEOREM. *There exists constants $\varepsilon(n)$ such that, if K or R is a smooth function satisfying:*

(i) $\|K - 1\|_\infty \leqslant \varepsilon(2)$ *or* $\|R - R_0\|_\infty \leqslant \varepsilon(n)$;

(ii) *K or R is a uniformly nondegenerate function of order α, where $\alpha \leqslant n$ when n is even and $\alpha \leqslant n - 1$ when n is odd; i.e.,*

$$(*) \qquad |G(P, t)| \geqslant \begin{cases} \dfrac{C}{t^\alpha}, & \text{when } \alpha < n, \\[2ex] \dfrac{C}{t^n \log t}, & \text{if } \alpha = n \end{cases}$$

for $t \geqslant t_0$, uniformly in P, for all P in S^n.

(iii) $\deg(G|_{t=t_0}, 0) \neq 0$;

then the equation (0.1) has a solution.

In the original statement in [CY] of the theorem, we did not mention the uniformity requirement in the decay of the map $G(P, t)$ as t tends to infinity; we have only imposed $(*)$ condition at the initial points of K (or R).

We make two remarks concerning this uniformity assumption. The first is that in the case $\alpha = 2$, uniformity in $(*)$ is a consequence of the nondegenerate assumption on the critical points of the function K or R. The theorem in the case $\alpha = 2$ was used as the starting point in a continuity argument for our more general existence result in [CGY]. The second remark is that, in the general case, the uniformity requirement does not follow from the nondegenerate requirement on the critical points of K or R alone. In principle, it is possible to reduce this requirement to algebraic criteria on the Taylor coefficients of the function R at its critical points. For example, we determine below necessary and sufficient conditions on the Taylor coefficients of R at its critical points when $\alpha = 3$.

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