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A CORRECTION TO "THE DEFORMATION OF LAGRANGIAN MINIMAL SURFACES IN KÄHLER-EINSTEIN SURFACES"

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The function f_ε in (1) [1] needs to be at least of class C^3. This can be achieved by modifying f_ε to be

$$f_\varepsilon(x) = f_\varepsilon(|x|) = \left(\frac{\log \frac{|x|}{\varepsilon^2}}{\log \frac{1}{\varepsilon}}\right)^4 h_1\left(\frac{\log \frac{|x|}{\varepsilon^2}}{\log \frac{1}{\varepsilon}}\right)$$

for $\varepsilon^2 \leq |x| \leq \varepsilon$, where h_1 is a polynomial (of degree 3) satisfying $h_1(r)r^4 + h_2(r)(r-1)^4 = 1$ with another polynamial h_2. The new f_ε still satisfies $\lim_{\varepsilon\to 0}\int |\nabla f_\varepsilon|^2\, dA = 0$. Besides, the notion of stability in the paper should module out the trivial kernel which comes from the diffeomorphisms on Σ. Thus the definition is changed to:

Definition 1. A branched minimal immersion $\varphi : \Sigma \to (N^n, g)$ is called strictly stable if $\lim_{\varepsilon\to 0}\delta^2 A(f_\varepsilon V^\perp) > 0$ for nonzero $V^\perp$, where

$$V = \frac{\partial \varphi_t}{\partial t}|_{t=0},$$

$V^\perp$ is the projection of V to the normal bundle along $\varphi(\Sigma)$, f_ε is chosen as in (1), and φ_t is a smooth family of maps from Σ to N with $\varphi_0 = \varphi$. It is called stable if $\lim_{\varepsilon\to 0}\delta^2 A(f_\varepsilon V) \geq 0$

Since $E_g(\varphi, h) = E_g(\varphi X, X^*(h))$ for diffeomorphisms on Σ, we thus define (φ, h) to be equivalent to $(\varphi X, X^*(h))$ when X is homotopic to the identity. Note that (φ, h) is also equivalent to $(\varphi, \lambda^2 h)$. Denote the equivalent class by $[(\varphi, h)]$. Accordingly, there is also an equivalent relation on the tangent level. Hence we define:

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Definition 2. A critical point $[(\varphi, h)]$ of E_g is called strictly stable if one has $\delta^2 E[(V, \dot{h})] > 0$ for any nonzero $[(V, \dot{h})]$, where $V = \frac{\partial \varphi_t}{\partial t}|_{t=0}$ and $\dot{h} = \frac{\partial h_t}{\partial t}|_{t=0}$.

The similar arguments in Sections 1 and 2 of [1] still work with some additional care under these new definitions, and Theorem 1 is stated as:

Theorem 1. *If a branched minimal immersion $\varphi : \Sigma \to (N^n, g)$ is strictly stable, then its corresponding critical point on E_g is strictly stable. However, the corresponding branched minimal immersion of a strictly stable critical point on E_g is only known to be stable.*

The strict stability in the conclusions of Theorem 2 and Corollary 2 thus also change to stability accordingly. But this is all we need for Theorem 3, the rest of the paper stays the same.

References

[1] Y. I. Lee, *The deformation of Lagrangian minimal surfaces in Kähler-Einstein surfaces*, J. Differential Geom. **50** (1998) 299–330.

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