

## Peer Review

# Review of: "Isometric Splitting of Metrics Without Conjugate Points on $\Sigma \times S^1$ "

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The author considers the Cartesian product  $M$  of a circle and a hyperbolic surface equipped with a metric without conjugate points. The main result claims that the universal cover of  $M$  must decompose as a Riemannian product. However, the given proofs rely on some claims that are not justified, which are listed below:

1. The natural circle action from the circle factor of  $M$  is claimed to be isometric. This is not true for a general metric on  $M$ , and it is not clear how this comes about from the assumption about conjugate points.
2. The unit-length renormalization of the Killing vector field associated with the circle action is claimed to be Killing. This is only possible if the original Killing vector field has constant length, which is in general not true.
3. The use of O'Neill tensors suggests that we are working in the setting of the cited paper by O'Neill, which is a Riemannian submersion. My understanding is that there is a tacit assumption that the projection from  $M$  onto the surface factor is a Riemannian submersion.

Of course, all of these claims must be true for the claimed result to be true. However, without further work to justify these claims, I cannot recommend this article.

## Declarations

**Potential competing interests:** No potential competing interests to declare.