Gradient trajectories lying on isolated surface singularities do not oscillate at their limit point.

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Assume that $\mathbb{R}^n$ is equipped with a real analytic Riemannian metric $\mathbf{g}$. Let $f : \mathbb{R}^n \to \mathbb{R}$ be a real analytic function singular at O the origin. We would like to understand the dynamics of ∇f in a neighbourhood of the critical point O, where ∇f stands for the gradient vector field of the function f associated with the metric $\mathbf{g}$. We are particularly interested in the oscillating/non-oscillating behaviour in a neighbourhood of O of any gradient trajectory accumulating on O. If such a trajectory lies in a real analytic surface with an isolated singularity at O, then this trajectory cannot oscillate at O.