Existence of an invariant Riemann surface through a zero of a holomorphic vector field

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As part of my master thesis, I showed that for each holomorphic vector field that has a point where it vanishes and where its derivative is invertible, there exists a Riemann surface going through this point and invariant under the complex flow of this vector field. In fact, I proved that for each eigenvector of the derivative at this point of this vector field, that corresponds to an eigenvalue that is an extremal point of the convex hull of the union of the spectrum and 0, there is such a Riemann surface whose tangent space contains this eigenvector.

The terminology involved in the proof is quite elementary. The only deep result used is the differentiable version of the Grobman-Hartman theorem (proved in 2003) which gives sufficient conditions for the C^1-equivalence of a vector field to its linear part near a point where it vanishes.