Mathematics > Differential Geometry

On complete stable minimal surfaces in 4-manifolds with positive isotropic curvature

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We prove the nonexistence of stable immersed minimal surfaces uniformly conformally equivalent to the complex plane in any complete orientable four-dimensional Riemannian manifold with uniformly positive isotropic curvature. We also generalize the same nonexistence result to higher dimensions provided that the ambient manifold has uniformly positive complex sectional curvature. The proof consists of two parts, assuming an "eigenvalue condition" on the Cauchy-Riemann operator of a holomorphic bundle, we prove (1) a vanishing theorem for these holomorphic bundles on the complex plane; (2) an existence theorem for holomorphic sections with controlled growth by Hormander's weighted L^2-method.

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