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Gluing theorems for anti-self-dual metrics

On an oriented 4-manifold, it is natural to study anti-self-dual (ASD) conformal structures: conformal equivalence classes of Riemannian metrics with ASD Weyl tensor. We give a gluing theorem for ASD conformal structures that applies in geometrical situations more general than those considered by previous authors. The methods used are those of non-linear elliptic PDEs, generalizing an approach to this problem proposed by Floer. The main result gives sufficient conditions for the existence of ASD conformal structures on 'generalized connected sums' of non-compact ASD 4-manifolds with cylindrical ends. The gluing theorem applies in particular to give results about connected sums of ASD orbifolds along (isolated) singular points.

Reference: A. G. Kovalev and M. A. Singer, Gluing theorems for anti-self-dual metrics, preprint math. DG/9802055.