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Conformally invariant rigidity theorems on four-manifolds with boundary

We introduce conformal and smooth invariants on oriented, compact four-manifolds with boundary and show that "positivity" conditions on these invariants will impose topological restrictions on underlying manifolds with boundary. We also establish conformally invariant rigidity theorems for Bach-flat four-manifolds with boundary under the assumptions on these invariants. It is noteworthy to point out that we rule out some examples arising from the study of closed manifolds in the setting of manifolds with umbilic boundary.