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The Spread of the Shape Operator as Conformal Invariant

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Abstract: The notion the spread of a matrix was first introduced fifty years ago in algebra. In this article, we define the spread of the shape operator by applying the same idea to submanifolds of Riemannian manifolds. We prove that the spread of shape operator is a conformal invariant for any submanifold in a Riemannian manifold. Then, we prove that, for a compact submanifold of a Riemannian manifold, the spread of the shape operator is bounded above by a geometric quantity proportional to the Willmore-Chen functional. For a complete non-compact submanifold, we establish a relationship between the spread of the shape operator and the Willmore-Chen functional. In the last section, we obtain a necessary and sufficient condition for a surface of rotation to have finite integral of the spread of the shape operator.



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