

MASS OF RAYS ON COMPLETE OPEN SURFACES

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This research explored the relationship between total curvature and the mass of rays on finitely connected complete open surfaces, deriving several integral formulas. On a complete, non-compact Riemannian 2-manifold, a ray is a unit speed geodesic where every sub-arc minimizes distance, ensuring the distance between any two points on a ray equals its arc length. Such manifolds have at least one ray passing through each point due to their completeness and non-compactness. The primary goal was to demonstrate three key theorems regarding the relationships between total curvature, Euler characteristics, and ray behaviour on Riemannian surfaces. The study revisited previous research on total curvature and Euler characteristics, explored the relationship between the mass of rays and total curvature, and examined Riemannian planes with varying Gaussian curvature. It also examined the relationship between isoperimetric inequality, positive total curvature and the asymptotic behaviour of mass integrals. In conclusion, this study extended the previous results on total curvature to manifolds with one end, providing new insights into the interplay between total curvature and Riemannian metrics. These findings can be extended to manifolds with K-ends and general Alexandrov spaces, emphasizing the importance of total curvature.

Keywords: Complete open surfaces, Finitely connected manifolds, Geodesics, Total curvature