

# Volume Comparison and Its Applications in Riemann–Finsler Geometry

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We introduce a new geometric quantity, *the mean covariation* for Finsler metrics, and establish a volume comparison theorem. As an application, we obtain some precompactness and finiteness theorems for Finsler manifolds. © 1997 Academic Press

## 1. INTRODUCTION

Early work in conjunction with the global comparison geometry of Finsler manifolds was done by L. Auslander [A], who proved that if a complete Finsler  $n$ -manifold  $(M, F)$  satisfies  $\text{Ric}_M \geq (n-1)$ , then the diameter  $\text{diam}_M \leq \pi$ . In particular,  $\pi_1(M)$  is finite. This is the Bonnet–Myers theorem if  $F$  is Riemannian. Further, he proved that if a complete Finsler manifold  $(M, F)$  has non-positive flag curvature, then the exponential map  $\exp_x: T_x M \rightarrow M$  is a local  $C^1$ -diffeomorphism. This is the Cartan–Hadamard theorem if  $F$  is Riemannian. We point out that Auslander used the Cartan connection and stated the above theorems under slightly stronger conditions on curvatures, because he did not realize that the curvature terms in the second variation formula can be simplified to the flag curvature. See [AZ2, BCh] for simplified formulas. We remark that the flag curvature is independent of a particular choice of connections, and hence is of particular interest in the metric geometry of Finsler manifolds. See [L, AZ1, D1–D3, GKR, Mo1, Mo2, K1, K2, BCh], etc., for other interesting work on global Finsler geometry.

In Riemann geometry, the Bishop–Gromov volume comparison theorem [BCr, GLP] plays a very important role in the global differential geometry of Riemann manifolds. One of its applications is the Gromov precompactness theorem for the class  $\mathfrak{C}(n, \lambda, d)$  with respect to the Gromov–Hausdorff distance  $d_{GH}$ , where  $\mathfrak{C}(n, \lambda, d)$  denotes the set of all Riemann manifolds  $(M, g)$  satisfying  $\text{Ric}_M \geq (n-1)\lambda$  and  $\text{diam}_M \leq d$ . For  $\varepsilon > 0$ ,  $R \geq 1$ , consider

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# Riemannfinsler Geometry

**K Morrison**



## **Riemannfinsler Geometry:**

Riemannfinsler Geometry: Bestsellers in 2023 The year 2023 has witnessed a remarkable surge in literary brilliance, with numerous engrossing novels enthralling the hearts of readers worldwide. Lets delve into the realm of bestselling books, exploring the engaging narratives that have charmed audiences this year. Riemannfinsler Geometry : Colleen Hoovers "It Ends with Us" This touching tale of love, loss, and resilience has gripped readers with its raw and emotional exploration of domestic abuse. Hoover masterfully weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can succeed. Uncover the Best : Taylor Jenkins Reids "The Seven Husbands of Evelyn Hugo" This spellbinding historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reids compelling storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Riemannfinsler Geometry : Delia Owens "Where the Crawdads Sing" This mesmerizing coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens weaves a tale of resilience, survival, and the transformative power of nature, captivating readers with its evocative prose and mesmerizing setting. These bestselling novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of engaging stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a exceptional and thrilling novel that will keep you speculating until the very end. The novel is a cautionary tale about the dangers of obsession and the power of evil.

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