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Counting geodesic arcs via microlocal analysis

A classical problem in Riemannian geometry consists in counting the number of geodesics arcs joining two given points of a compact surface. I will review the history of this problem and relate it to the dynamical properties of the so-called geodesic flow. Following the works of many people over the last twenty years, I will then explain how microlocal analysis has revealed itself to be a powerful tool in order to describe the deep dynamical properties of such flows on negatively curved surfaces. As an illustration of this recent progress, I will discuss what this microlocal approach tells us on the study of this classical problem from Riemannian geometry.