MR0455028 (56 #13269)
Vigué-Poirrier, Micheline; **Sullivan, Dennis**
The homology theory of the closed geodesic problem.
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58E10

It has been (and still is) an open question whether there exist infinitely many (geometrically distinct) periodic geodesics on an arbitrary Riemannian manifold. Let M be Riemannian, compact, connected, simply connected, of dimension greater than one. Let ΛM be the free loop space of M (consisting of all continuous loops in M, no base points fixed). It was great progress when in 1969 D. Gromoll and W. Meyer proved that the answer is positive when the Betti numbers of ΛM are unbounded [same J. **3** (1969), 493–510; MR0264551 (41 #9143)]. Some people conjectured that this was true if and only if the rational cohomology algebra of M required at least two generators. A proof could not be given.

In the paper under review the authors give a detailed proof of this conjecture making essential use of Sullivan's version of rational homotopy theory (especially the machinery of minimal models of differential graded algebras). The proof is then not very complicated since Sullivan's methods are very powerful, sufficiently so to handle this problem.

Reviewed by *Peter Klein*