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Collapsing Riemannian manifolds while keeping their curvature bounded. II. (English)

Zbl 0727.53043

J. Differ. Geom. 32, No. 1, 269-298 (1990).

[Part I, cf. *ibid.* 23, 309-346 (1986; Zbl 0606.53028).]

In part I of this paper, the authors introduced the concept of an F-structure, which generalizes the notion of torus actions. They showed that if a compact manifold admits an F-structure, then it also admits Riemannian metrics with bounded curvature and arbitrarily small injectivity radius.

In the present paper the converse is proved. More generally, any complete Riemannian manifold may be decomposed into two sets: (1) The set of points with “small” injectivity radius, and (2) the set of points with not so small injectivity radius. Here “small” is measured in terms of pointwise curvature bounds. The set (2) has controlled geometry and topology and is not discussed further. The set (1) on the other hand admits an F-structure.

Other remarkable such “collapsing” results have been obtained independently by *K. Fukaya* in e.g. *Differ. Geom.* 25, 139-156 (1987; Zbl 0606.53027); *J. Math. Soc. Japan* 41, 333-356 (1989; Zbl 0703.53042)]. Recent joint efforts of all three authors have resulted in a more complete picture in which “all collapsing directions” are taken into account. In this work the (flat) F-structures are replaced with a notion of (nilpotent) N-structures.

Reviewer: [K.Grove](#)

MSC:

53C20 Global Riemannian geometry, including pinching

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