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Title: A geometric problem and the Hopf Lemma

Abstract: A classical result of A.D. Alexandrov states that a connected compact smooth n -dimensional manifold without boundary, embedded in \mathbb{R}^{n+1} , and such that its mean curvature is constant, is a sphere. Here we study the problem of symmetry of M in a hyperplane $X_{n+1} = \text{constant}$ in case M satisfies: for any two points (X', X_{n+1}) , (X', \widehat{X}_{n+1}) on M , with $X_{n+1} > \widehat{X}_{n+1}$, the mean curvature at the first is not greater than that at the second. Symmetry need not always hold, but we establish it under some additional conditions. Some variations of the Hopf Lemma will also be presented. This is a joint work with Louis Nirenberg.