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A diameter bound for compact surfaces and the Plateau-Douglas problem

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Abstract. In this paper we give a geometric argument for bounding the diameter of a connected compact surface (with boundary) of arbitrary codimension in Euclidean space in terms of Topping's diameter bound for closed surfaces (without boundary). The obtained estimate is potentially optimal for minimal surfaces in the sense that optimality follows if the Topping conjecture holds true. Our result directly implies an explicit nonexistence criterion in the classical Plateau-Douglas problem. We exhibit examples of boundary contours to ensure that our criterion is of novel type compared with classical criteria based on the maximum principle and White's criterion based on a density estimate.

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