Preface

We present in this monograph a survey of recent spectacular successes in classical minimal surface theory. Many of these successes were covered in our survey article "The classical theory of minimal surfaces" that appeared in the Bulletin of the AMS [**139**]. The focus of our BAMS article was to describe the work that led up to the theorem that the plane, the helicoid, the catenoid and the one-parameter family of Riemann minimal examples are the only properly embedded, minimal planar domains in $\mathbb{R}^3$. The proof of this result depends primarily on work of Colding and Minicozzi [**36, 39**], Collin [**41**], López and Ros [**117**], Meeks, Pérez and Ros [**145**] and Meeks and Rosenberg [**158**]. Partly due to limitations of length of our BAMS article, we omitted the discussion of many other important recent advances in the theory. The central topics missing in [**139**] and which appear here include the following ones:

1. The topological classification of minimal surfaces in $\mathbb{R}^3$ (Frohman and Meeks [**67**]).
2. The uniqueness of Scherk's singly-periodic minimal surfaces (Meeks and Wolf [**165**]).
3. The Calabi-Yau problem for minimal surfaces based on work by Nadirashvili [**177**] and Ferrer, Martín and Meeks [**60**].
4. A more detailed survey on the Colding-Minicozzi theory for embedded minimal disks, and some aspects for the case of finite genus [**26**].
5. The asymptotic behavior of minimal annular ends with infinite total curvature (Meeks and Pérez [**135**]).
6. The local removable singularity theorem for minimal laminations and its applications: quadratic decay of curvature theorem, dynamics theorem and the local picture theorem on the scale of topology (Meeks, Pérez and Ros [**143**]).

Besides the above items, every topic that is in [**139**] appears here as well, with small modifications and additions. Another purpose of this monograph is to provide a more complete reference for the general reader of our BAMS article where he/she can find further discussion on related topics covered in [**139**], as well as the proofs of some of the results stated there.

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