original deformation theorem [29, Theorems 7.7.1 and 7.7.2] into one theorem through the explicit form of the constraints. In our proof of Theorem 2.5.1, we replace certain pieces of the original proof as presented by Krantz and Parks [29, Pages 211–222] without reproducing all the other details of their proof. We found their exposition quite well-structured, making it easier to identify the modifications needed to get our theorem.

Remark 2.5.4. *The bound for* $\mathrm{M}(P)$ *in Theorem 2.5.1 is larger than the classical bound. We get this large bound because we generate* P *through retractions alone, and not using the usual Sobolev-type estimates [29, Pages 220–222]. And of course, the* Δ *in the coefficient of the extra term means that it becomes unimportant as the simplicial complex is appropriately subdivided.*

2.5.1 Proof of the Simplicial Deformation Theorem

At the heart of the modification of the deformation theorem (from cubical grid to simplicial complex settings) is the recalculation of an integral over the current and its boundary. This integral appears in a bound on the *Jacobian of the retraction*, which measures the expansion in mass of the current resulting from the process of retracting it on to the simplices of the simplicial complex. To do this recalculation, we consider the retraction ϕ one step at a time, building it through independent choices of centers to project from in every simplex and its every face.

We first describe the general set up of retraction within a simplex. We then present certain bounds on the mass expansion resulting from the retraction in Lemmas 2.5.6, 2.5.7, and 2.5.8. In particular, we obtain bounds on the expansion that are independent of the choice of points from which we project. These bounds are independent of the particular current that we retract on to the simplicial complex. But we employ these bounds to subsequently bound the overall expansion of mass of the current resulting