Title: Nonabsolutely convergent integrals

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Abstract: In this thesis we develop the theory of nonabsolutely convergent Henstock-Kurzweil type packing integrals in different spaces. In the framework of metric spaces we define the packing integral and the uniformly controlled integral of a function with respect to metric distributions. Applying the theory to the notion of currents we then prove a generalization of the Stokes theorem. In $\mathbb{R}^n$ we introduce the packing $\mathcal{R}$ and $\mathcal{R}^*$ integrals, which are defined as charges – additive functionals on sets of bounded variation. We provide comparison with miscellaneous types of integrals such as $\mathcal{R}$ and $\mathcal{R}^*$ integral in $\mathbb{R}^n$ or MC_α integral in $\mathbb{R}$. On the real line we then study a scale of integrals based on the so called p-oscillation. We show that our indefinite integrals are a.e. approximately differentiable and we give comparison with other nonabsolutely convergent integrals.

Keywords: Nonabsolutely convergent integrals, BV sets, Henstock-Kurzweil integral, Divergence theorem, Analysis in metric measure spaces