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Estimates for some geometric maximal functions associated with a set of directions

We will discuss geometric maximal functions associated with averages over line segments oriented in a set of directions and their singular integral analogues. The maximal functions can be regarded as "singular" variants of the Nikodym maximal function associated with thin tubes. The main problem is to quantify the dependence of the operator norm on the number and the distribution of directions. We will discuss a divide-and-conquer type approach to this problem for L^2 estimates.