# HEAVY TAILED APPROXIMATE IDENTITIES AND $\sigma$-STABLE MARKOV KERNELS

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ABSTRACT. The aim of this paper is to present some results relating the properties of stability, concentration and approximation to the identity of convolution through non-necessarily mollification type families of heavy tailed Markov kernels. A particular case is provided by the kernels $K_t$ obtained as the $t$ mollification of $L^{\sigma(\xi)}$ selected from the family $\mathcal{L} = \{L^\sigma : \widehat{L^\sigma}(\xi) = e^{-|\xi|^\sigma}, 0 < \sigma < 2\}$, by a given function $\sigma$ with values in the interval $(0, 2)$. We show that a basic Harnack type inequality, introduced by C. Calderón in the convolution case, becomes at once natural to the setting and useful to connect the concepts of stability, concentration and approximation of the identity. Some of the general results are extended to spaces of homogeneous type since most of the concepts involved in the theory are given in terms of metric and measure.