A Class of Asymptotically Self-Similar Stable Processes with Stationary Increments

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Abstract: We generalize the BM-local time fractional symmetric $\alpha$-stable motion introduced by Cohen and Samorodnitksy by replacing the local time with a general continuous additive functional (CAF). We show that the resulting process is symmetric $\alpha$-stable and has stationary increments. Depending on the CAF considered, the process is either self-similar or asymptotically self-similar, lying in the domain of attraction of the BM-local time fractional symmetric $\alpha$-stable motion. We also show that the process arises as a weak limit of a discrete “random rewards scheme” similar to the one described by Cohen and Samorodnitsky.

Keywords: Stable process, self-similar process, stationary increments, local time, additive functional

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