A Moebius–Poincare Deconvolution Problem

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Abstract: Let $\mathbf{H}$ be the Poincare plane on which $\mathbf{SL}(2, \mathbf{R})$ acts on it by a Moebius transformation. Suppose that we have a random quantity X on $\mathbf{H}$, of which we only observe a version Y corrupted by a random Moebius transformation ε of known density f_ε on $\mathbf{SL}(2, \mathbf{R})$,

$$Y = \varepsilon X \,.$$

It is the objective of this work to propose a nonparametric deconvolution estimator for the density $f_X : \mathbf{H} \to \mathbf{R}$ of X based on the density $f_Y : \mathbf{H} \to \mathbf{R}$ of Y. The main technique will be through the use of the Helgason-Fourier transform.