

# Absolute continuity of probability distributions satisfying smoothing equations with complex coefficients

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We are going to show how the Fourier transform may be used to prove absolute continuity of some probability distributions. The probabilistic aspects of the results will be explained in a very elementary way and they will be rather reduced. We are going to put emphasis on the Fourier and complex analysis.

Suppose that a pair of complex valued random variables  $T_1, T_2$  is given. Let  $X$  be a  $\mathbb{C}$ -valued random variable with the property that  $X$  has the same law as

$$T_1X_1 + T_2X_2,$$

where  $X_1, X_2$  are i.i.d copies of  $X$  independent of  $(T_1, T_2)$ . We prove that under natural assumptions the law of  $X$  has a density. Our result applies in particular to Biggins' martingale with complex parameter.

The talk is based on the paper: E. Damek, S. Mentemeier, Absolute Continuity of Complex Martingales and of Solutions to Complex Smoothing Equations, *Electronic Communications in Probability*, 23 paper 60, 2018.

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