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We consider a semimartingale reflected Brownian motion in a two-dimensional wedge. Under standard assumptions on the parameters of the model (opening of the wedge, angles of the reflections on the axes, drift), we study the algebraic and differential nature of the Laplace transform of its stationary distribution. We derive necessary and sufficient conditions for this Laplace transform to be rational, algebraic, differentially finite or more generally differentially algebraic. These conditions are explicit linear dependencies among the angles involved in the definition of the model. To prove these results, we start from a functional equation that the Laplace transform satisfies, to which we apply tools from diverse horizons. To establish differential algebraicity, a key ingredient is Tutte's invariant approach, which originates in enumerative combinatorics. To establish differential transcendence, we turn the functional equation into a difference equation and apply Galoisian results on the nature of the solutions to such equations.

This is a joint work with M. Bousquet-Mélou, A. Elvey Price, S. Franceschi and C. Hardouin (see https://arxiv.org/abs/2101.01562 ).

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