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Lateral diffusion on a frozen random surface

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The lateral diffusion coefficient of a Brownian particle on a two-dimensional random surface is studied in the quenched limit that the surface configuration is constant in time. We start with the stochastic equation of motion for a Brownian particle on a curved surface, which has been derived by Naji and Brown. The mean square displacement of the particle projected on a base plane is calculated exactly under the condition that the surface with a random shape has no spatial correlation. The obtained lateral diffusion coefficient does not exceed the rigorous upper and lower bounds. Furthermore we show by dimensional analysis that the condition of no spatial correlation can be removed as long as the correlation is of short ranged. This study has been published in Europhysics Letters, 132, 50007 (2020).

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