

Vladimirov operator: periodic oscilation of the heat kernel

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We consider the heat semigroup $P_t = \exp(-tV)$ for the Vladimirov operator $Vf(x) = [D_{x_1}^2 + D_{x_2}^2 + D_{x_3}^2]f(x)$ acting on the 3D space Q_p^3 , where Q_p is the field of p -adic numbers. We show that P_t admits a continuous heat kernel $p(t, x, y)$ and that the function $p(t, x, x)$ (which does not depend on x) has the form $p(t, x, x) = t^{-3/2}A(\log_2 t)$ where $A(\tau)$ is 1-periodic continuous non-constant function. In particular, the complete monotone function $t \rightarrow p(t, x, x)$ does not vary regularly.