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Translation invariant Radon transforms. (English) Zbl 0748.44003

Math. Balk., New Ser. 5, No. 1, 40-46 (1991).

Let R_μ be the generalized Radon transform and R_μ^t the generalized dual Radon transform, i.e. $(R_\mu f)(\omega,p) = \int_{\omega\cdot x=p} f(x)\mu(x,\omega,p)dx$, $(R_\mu^t f)(x) = \int_{S^{n-1}} f(\omega, x\cdot\omega)\mu(x,\omega,\omega\cdot x)d\omega$. These transforms are called exponential if $\mu(x,\omega,p) = \mu_1(\omega,p)e^{\mu_2(\omega)\cdot x}$ and translation invariant if $(f_a(x) = f(a+x))$ $(R_\mu f_a)(\omega,p) = \nu(a,\omega,p)(R_\mu f)(\omega,p+\omega\cdot a)$, $(R_\mu^t f)_a = R_\mu^t(f_{\omega\cdot a}\nu(a,\cdot,\cdot))$ with a suitable function ν.

It is shown that $R_\mu(R_\mu^t)$ is exponential if and only if $R_\mu(R_\mu^t)$ is translation invariant. Conditions for $R_\lambda^t \circ R_\mu$ to be translation invariant (in the usual sense) are given. For exponential R_μ an inversion formula and a support theorem are proved.

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exponential Radon transform; translation invariant Radon transform; generalized Radon transform; dual Radon transform; inversion formula; support theorem