Wavelets for Non-expanding Dilations and the Lattice Counting Estimate - DTU Orbit
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We show that problems of existence and characterization of wavelets for non-expanding dilations are intimately connected
with the geometry of numbers; more specifically, with a bound on the number of lattice points in balls dilated by the powers
of a dilation matrix $A \in \text{GL}(n, \mathbb{R})$. This connection is not visible for the well-studied class of expanding dilations since the
desired lattice counting estimate holds automatically. We show that the lattice counting estimate holds for all dilations $A$
with $|\det A| \neq 1$ and for almost every lattice $\Gamma$ with respect to the invariant probability measure on the set of lattices. As a
consequence, we deduce the existence of minimally supported frequency (MSF) wavelets associated with such dilations
for almost every choice of a lattice. Likewise, we show that MSF wavelets exist for all lattices and almost every choice of a
dilation $A$ with respect to the Haar measure on $\text{GL}(n, \mathbb{R})$.

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