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Section:

10. Partial Differential Equations

1991 Mathematical Subject Classification: 35, 42, 46, 47
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An embedding theorem of Sobolev type related to a generalized Fourier transform and applications to partial differential equations with singularity

We construct a generalized Fourier transform related to the operator $\mathcal{D}_c = \partial/\partial x - (c/x)R$, where $Ru(x) = u(-x)$ and $c > -1/2$. Using this transform, we define a space of Sobolev type and obtain an embedding theorem for this space. Applications to the Cauchy problems for partial differential equations with singularity will be presented. For example we give the explicit solution of the Cauchy problem for the heat equation with singularity.

Reference: S. Watanabe, An embedding theorem of Sobolev type for an operator with singularity, *Proc. Amer. Math. Soc.* **125** (1997), 839–848.