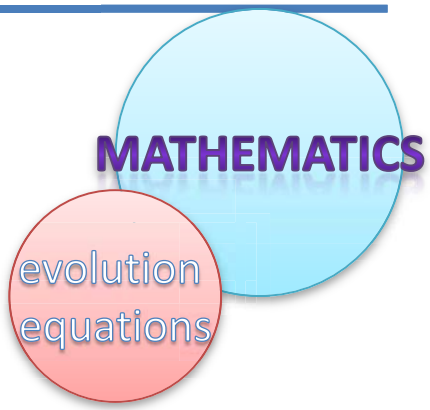

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Major

MATHEMATICS, Functional Equations

■ **Research topics**

FEYNMAN PATH INTEGRALS FOR SCHROUDINGER EQUATIONS

Keywords

evolution equations, vector measure, Feynman path integrals, functional spaces

Contents

■ Overview (background, goal, detail)

The idea of Feynman's integral is a topic of great interest in mathematics and physics.
But rigorous mathematical treatment of this integral is not enough.
We shall define a kind of operator-valued integration and define the path integrals.

■ Process and potentials

It is well known that Feynman path integrals for Schroudinger equation is not
Represented by (scalar-valued) measures.

We shall introduce generalized vector measures so that
Feynman path integrals has a mathematically rigorous meaning.

We study the existence of the path integrals for Schroudinger equation
with singular potentials. Our class of potentials is wide enough.

（equations）

We shall construct a family of unique solutions to the Schrödinger equation in $\mathbb{R}^N$:

$$\frac{\partial}{\partial t}u(t,x) = i\triangle u(t,x) - iU(t,x)u(t,x), \quad u(0,x) = \varphi(x), \quad \varphi \in L^2(\mathbb{R}^N;\mathbb{C})$$

is written as the path integral

$$u(t,x) = \int_{\Omega_{[0,t]}} e^{-i\int_0^t U(\tau,\gamma(\tau))d\tau}\varphi(\gamma(0))d\mu(\gamma), \quad \varphi \in L^2(\mathbb{R}^N;\mathbb{C}).$$

Here we denote by γ a path on $\mathbb{R}^N$, and $U \in L^\infty_{loc}(\mathbb{R}^N\backslash\mathcal{N},\mathbb{R})$ where $\mathcal{N}$ is a closed set of measure 0.

Intellectual properties (Patents, computer programs), productization, publications and social/industrial contributions

Potential of social/industrial contribution

■ Contribution to academic

NACA2011 The seventh international conference on Nonlinear Analysis and Convex