

AFFINELY-RIGID BODY AND OSCILLATORY TWO-DIMENSIONAL MODELS

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Abstract. Discussed are some classical and quantization problems of the affinely-rigid body in two dimensions. Strictly speaking, we consider the model of the harmonic oscillator potential and then discuss some natural anharmonic modifications. It is interesting that the considered doubly-isotropic models admit coordinate systems in which the classical and Schrödinger equations are separable and in principle solvable in terms of special functions on groups.

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1. Classical Description

Let us consider two Euclidean spaces (N, U, η) and (M, V, g) , respectively the material and physical spaces. Here N and M are the basic point spaces, U and V are their linear translation spaces, and $\eta \in U^* \otimes U^*$, $g \in V^* \otimes V^*$ are their metric tensors.

The configuration space of the affinely-rigid body

$$Q := \text{Aff}(N, M)$$

consists of affine isomorphisms of N onto M . The material labels $a \in N$ are parametrized by Cartesian coordinates a^K [1]. Cartesian coordinates in M will be denoted by y^i and the corresponding geometric points by y . The configuration $\Phi \in Q$ is to be understood in such a way that the material point $a \in N$ occupies