

## Supersymmetry and Shape Invariance of Hartmann Potential and Ring-Shaped Oscillator Potential in the $r$ and $\theta$ Dimensions of Spherical Polar Coordinates

QIAN Shang-Wu,<sup>1</sup> HUANG Bo-Wen,<sup>2</sup> WANG De-Yun,<sup>2</sup> and GU Zhi -Yu<sup>2</sup>

<sup>1</sup> Physics Department, Peking University, Beijing 100871, China

<sup>2</sup> Physics Department, Capital Normal University, Beijing 100037, China

(Received: 2001-12-14; Revised: )

**Abstract:** This article shows that in spherical polar coordinates, some noncentral separable potentials have supersymmetry and shape invariance in the  $r$  and  $\theta$  dimensions, we choose Hartmann potential and ring-shaped oscillator as two important examples, thus in principle the energy eigenvalues and energy eigenfunctions of such the potentials in the  $r$  and  $\theta$  dimensions can be obtained by the method of supersymmetric quantum mechanics. Here we use an alternative method to get the required results.

PACS: 03.65.Ge, 03.65.Fd, 03.65.Bz

**Key words:** Hartmann potential, ring-shaped oscillator potential, supersymmetric quantum mechanics, shape invariance, noncentral separable potential, spherical polar coordinates

[\[Full text: PDF\]](#)

Close