

Internship Equations ... a Memoir

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October 7, 2015

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1 Untranslated Schrodinger Equation

1.1 Partial Differential Equation

$$-\nabla^2\Psi + (x^2 + y^2 + x^2y^2)\Psi = E\Psi$$

1.2 Moment Equation

$$-p(p-1)\mu(p-2, q) - q(q-1)\mu(p, q-2) + \mu(p+2, q) + \mu(p, q+2) + \mu(p+2, q+2) - E\mu(p, q) = 0$$

1.3 Summation Moment Formulation

$$\mu(p, q) = \sum_{j=0}^N M(p, q, 2j)\mu(2j, 2j)$$

2 Translated Scaled Schrodinger Equation

2.1 Partial Differential Equation

$$-[\nabla^2 + 4\alpha(x\frac{\partial}{\partial x} + y\frac{\partial}{\partial y}) + 4\alpha^2(x^2 + y^2) + 4\alpha]\tilde{\varphi}_a + [(x+\tau_1)^2 + (y+\tau_2)^2 + (x+\tau_1)^2(y+\tau_1)^2]\tilde{\varphi}_a = E\tilde{\varphi}_a$$

2.2 Moment Equation

$$\begin{aligned} & -p(p-1)\tilde{\mu}_\alpha(p-2, q) - q(q-1)\tilde{\mu}_\alpha(p, q-2) + [4\alpha(p+q+1) + \tau_1^2 + \tau_2^2 + \tau_1^2\tau_2^2 - E]\tilde{\mu}_\alpha(p, q) + \\ & 2\tau_1(\tau_2^2 + 1)\tilde{\mu}_\alpha(p+1, q) + 2\tau_2(\tau_1^2 + 1)\tilde{\mu}_\alpha(p, q+1) + 4\tau_1\tau_2\tilde{\mu}_\alpha(p+1, q+1) + \\ & (\tau_2^2 - 4\alpha^2)\tilde{\mu}_\alpha(p+2, q) + (\tau_1^2 - 4\alpha^2 + 1)\tilde{\mu}_\alpha(p, q+2) + 2\tau_2\tilde{\mu}_\alpha(p+2, q+1) + 2\tau_1\tilde{\mu}_\alpha(p+1, q+2) + \tilde{\mu}_\alpha(p+2, q+2) = 0 \end{aligned}$$

2.3 Summation Moment Formulation

$$\tilde{\mu}_\alpha(p, q) = \sum_{j=0}^Q \tilde{M}_\alpha(p, q, j)\tilde{\mu}_\alpha(p_j, q_j)$$