

$$\frac{d^2 y}{dx^2} + \left(A + B \frac{e^{-x}}{x} - \frac{C}{x^2} \right) y = 0$$

$$A = \frac{2mE}{\hbar^2 \lambda^2} \quad B = \frac{2m g^2}{\hbar^2 \lambda}$$

$$C = l(l+1)$$

① $l=1, C=2$
 $y = N \cdot x^2 e^{-ax}$

$$\int_0^\infty y^2 dx = N^2 \int_0^\infty x^4 e^{-2ax} dx$$

$$= \frac{N^2}{(2a)^5} \int_0^\infty x^4 e^{-x} dx = \frac{N^2}{(2a)^5} 4! = \frac{N^2 \cdot 3 \cdot 2^3}{a^5 \cdot 2^5}$$

$$= \frac{N^2 \cdot 3}{4a^5} = 1 \quad N = \frac{2}{\sqrt{3}} a^{\frac{5}{2}}$$

$$N^2 = \frac{4}{3} a^5$$

$$A = \min \frac{4}{3} a^5 \int_0^\infty \left\{ (2x - ax^2)^2 e^{-2ax} \right.$$

$$\left. - B \frac{e^{-x}}{x} x^4 e^{-2ax} + \frac{C}{x^2} x^4 e^{-2ax} \right\} dx$$

$$= \min \frac{4}{3} a^5 \left[\int_0^\infty \left\{ (4+C)x^2 + 4ax^3 + a^2 x^4 \right\} e^{-2ax} dx \right.$$

$$\left. - B \int_0^\infty x^3 e^{-(2a+1)x} dx \right]$$

$$\lambda \rightarrow \infty \quad y \rightarrow \infty$$

$$\lambda = \frac{2mg^2}{\hbar^2}$$

$$\frac{\hbar^4}{m^2} \frac{g^2}{g^2} = 0 \frac{g^2}{g^2}$$

2.3.4

$$\frac{1}{(2a)^3} \int_0^{\infty} \left\{ (4+c)x^2 - 2x^3 + \frac{x^4}{4} \right\} e^{-x} dx,$$

$$= \frac{1}{(2a)^3} \left\{ \frac{(4+c)2}{2} - 2 \cdot \frac{6}{6} + \frac{6}{4 \cdot 24} \right\} e^{-x}$$

$$= \frac{1}{(2a)^3} \frac{2(1+c)}{5} = \frac{1+c}{4a^3} \quad (2a+1)$$

$$\frac{B}{(2a+1)^4} \int_0^{\infty} x^3 e^{-x} dx = \frac{b}{(2a+1)^4}$$

$$A = \min \left\{ \frac{1+c}{3} a^2 - B \frac{8a^5}{(2a+1)^4} \right\}$$

$$\frac{dA}{da} = \frac{1+c}{3} 2a = \frac{40a^4}{(2a+1)^4} B (8a+5)$$

$$+ \frac{8 \cdot 4 \cdot 2a^5}{(2a+1)^5} B$$

$$= \frac{1+c}{3} 2a - \frac{8a^4(8a+5)}{(2a+1)^5} B$$

$$= 2a - \frac{8a^4(8a+5)}{(2a+1)^5} B$$

$$B = \frac{(2a+1)^5}{4a^3(8a+5)}$$

$2a = a'$

$A' = B \cdot \frac{a^5}{(a'+1)^4} - a'^2$

$B = \frac{2(a'+1)^5}{a'^3(a'+5)}$

$A' = \frac{2a'^2(a'+1)}{(a'+5)} - a'^2$
 $= \frac{a'^2(a'-3)}{a'+5}$

9.59
 256
 243
 160
 135
 250
 96
 169
 9) 206 + 2
 - 180
 26
 - 27
 90
 $\frac{2 \cdot 4^5}{3^3 \cdot 8} = \frac{4^4}{3^3}$
 $2 \cdot 10^5$

a'	A'	B	
3	0	9.59	14
4	1.78 (-16/9)	10.85	81
5	5	12.44	729
6	9.82	14.14	2916
7	16.33	15.92	729
8	24.64	17.71	10206
9	34.71	19.60	28242
10	46.66	21.40	70206
11	60.41	23.11	177147
12	76.96	24.78	444136
13	96.25	26.41	110592
14	118.24	27.99	279940
15	142.81	29.52	702060
16	169.96	31.01	1771470
17	199.69	32.46	4441360
18	231.96	33.87	11059200
19	266.71	35.24	27994000
20	303.96	36.57	70206000

$$A' = \frac{a'(a'+1)}{a'+3}$$

$$B = \frac{(a'+1)^3}{a'(a'+3)}$$

a'	A	B	λ	g
1	0	2		
2	0.8	2.7		
3				
4				
5				
6				
7	29.4	7.31		
8				
9				
10	89.2	10.24		
11				
12				
13				
14				
15	175	15.17		
16				
17				
18				
19				
20	330.4	20.13 !!		