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λ-.

[3, 4, 5, 6, 11].

$A(\lambda)Z(\lambda) = B(\lambda)$,

1) $A(\lambda)$ $B(\lambda)$

2) $A(\lambda)$ $B(\lambda)$ l

[10] F,

$$\inf_{\lambda \in F} \psi(Z(\lambda)), \qquad (1)$$

$Z(\lambda) = \{Z_1(\lambda), Z_2(\lambda), \ldots, Z_n(\lambda)\}$

$$\psi(\lambda) = \sqrt{\sum_{i=1}^{n} Z_i^2(\lambda)} \qquad \psi(\lambda) = \sqrt{\sum_{i=1}^{n} (Z_i(\lambda) - z_i^0)^2},$$

$z^0 = \{z_1^0, z_2^0, \ldots, z_n^0\}$ $\lambda \in F$

$\frac{\partial V_x}{\partial x} + \frac{\partial V_y}{\partial y} + \frac{\partial V_z}{\partial z} = 0$ [8]

$$\frac{\partial V_X}{\partial t} = V_X \frac{\partial V_X}{\partial X} + V_Y \frac{\partial V_Y}{\partial Y} + V_Z \frac{\partial V_Z}{\partial Z} = -\frac{1}{\rho}\frac{\partial p}{\partial X} + \nu\left(\frac{\partial^2 V_X}{\partial X^2} + \frac{\partial^2 V_X}{\partial Y^2} + \frac{\partial^2 V_X}{\partial Z^2}\right) + g_X \qquad (2)$$

$$\frac{\partial V_Y}{\partial t} = V_X \frac{\partial V_Y}{\partial X} + V_Y \frac{\partial V_Y}{\partial Y} + V_Z \frac{\partial V_Y}{\partial Z} = \frac{1}{\rho}\frac{\partial p}{\partial Y} + \nu\left(\frac{\partial^2 V_Y}{\partial X^2} + \frac{\partial^2 V_Y}{\partial Y^2} + \frac{\partial^2 V_Y}{\partial Z^2}\right) + g_Y \qquad (3)$$

$$\frac{\partial V_Z}{\partial t} = V_X \frac{\partial V_Z}{\partial X} + V_Y \frac{\partial V_Z}{\partial Y} + V_Z \frac{\partial V_Z}{\partial Z} = -\frac{1}{\rho}\frac{\partial p}{\partial Z} + \nu\left(\frac{\partial^2 V_Z}{\partial X^2} + \frac{\partial^2 V_Z}{\partial Y^2} + \frac{\partial^2 V_Z}{\partial Z^2}\right) + g_Z .$$

[illegible] (2), (3) [illegible] X, Y, Z [illegible], t [illegible] g_X, g_Y, g_Z [illegible] V_X, V_Y, V_Z [illegible] p. [illegible]

[illegible] $\overline{V}\left(\overline{R}\right)$ [illegible] $\overline{R} = 0$, [illegible] [7]

$$V_k\left(\overline{R}\right) = V_k\left(\overline{0}\right) + G_{km} X_m , \; G_{km} \equiv \left(\frac{\partial V_k}{\partial X_m}\right)_{R=0} ,$$

$$G_{11} + G_{22} + G_{33} = 0 , \tag{4}$$

[illegible] V_k [illegible] G_{km} [illegible] X_1, X_2, X_3.

[illegible] $V_k\left(\overline{0}\right) = 0$ [illegible] (4) [illegible] $G_{km} = 0$ [illegible] $\left\|G_{km}\right\|$ [illegible]

$$\left\|G_{km}\right\| = \left\|E_{km}\right\| + \left\|\Omega_{km}\right\| , \; E_{km} = E_{mk} = \frac{1}{2}\left(G_{km} + G_{mk}\right) , \; \Omega_{km} = -\Omega_{mk} = \frac{1}{2}\left(G_{km} - G_{mk}\right) .$$

[illegible]:

1. [illegible]

[illegible]:

$$V_x = GY , \quad V_y = 0 , \quad V_z = 0 ,$$

[illegible]

$$\left\|G_{km}\right\| = \begin{Vmatrix} 0 & G & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{Vmatrix} , \quad \left\|E_{km}\right\| = \begin{Vmatrix} 0 & \frac{1}{2}G & 0 \\ \frac{1}{2}G & 0 & 0 \\ 0 & 0 & 0 \end{Vmatrix} , \quad \left\|\Omega_{km}\right\| = \begin{Vmatrix} 0 & \frac{1}{2}G & 0 \\ -\frac{1}{2}G & 0 & 0 \\ 0 & 0 & 0 \end{Vmatrix} .$$

[illegible] G [illegible].

2. [illegible]

$$V_x = \frac{1}{2}GY , \quad V_y = \frac{1}{2}GX , \quad V_z = 0 .$$

[illegible]

$$\left\|G_{km}\right\| = \begin{Vmatrix} 0 & \frac{1}{2}G & 0 \\ \frac{1}{2}G & 0 & 0 \\ 0 & 0 & 0 \end{Vmatrix} , \quad \left\|E_{km}\right\| = \begin{Vmatrix} 0 & \frac{1}{2}G & 0 \\ \frac{1}{2}G & 0 & 0 \\ 0 & 0 & 0 \end{Vmatrix} , \quad \left\|\Omega_{km}\right\| = \begin{Vmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{Vmatrix} .$$

[illegible].

[illegible]

[illegible]

[illegible].

[illegible] $q(x)$ [illegible]: [2]

$$f(x)=\int_0^l G(x,s)q(s)ds\,, \tag{5}$$

[illegible] $G(x,s)$ [illegible] x [illegible] s. [illegible] $q(x)$ [illegible] $-m(s)\dfrac{\partial^2 f(s,t)}{\partial t^2}$, [illegible] $m(s)=\dfrac{q(s)}{g}$. [illegible] (5) [illegible]

$$f(x,t)=-\int_0^l G(x,s)m(s)\frac{\partial^2 f(s,t)}{\partial t^2}ds\,. \tag{6}$$

[illegible] $f(x)$ [illegible] $K(x,s)=G(x,s)m(x,s)$:

$$f(x)=\lambda\int_0^l K(x,s)f(s)ds\,. \tag{7}$$

[illegible] $G(x,s)$ [illegible], [illegible] $K(x,s)$ [illegible] $m(x)=const$ [illegible] (7) $f(x)\neq 0$ [illegible] λ, [illegible] λ [illegible] (7). [illegible] $f(x)$ [illegible] λ.

[illegible] (7) [illegible] $i=x_i\in(0,l)$, $i=\overline{1,N}$ [illegible]

$$\sum_{k=1}^{N}\sum_{j=1}^{N}K(\lambda,x_k,x_j)f_j(x_j)=f_k(x_k)\,, \tag{8}$$

[illegible] $K(\lambda,x_k,x_j)$ [illegible]

$$\left.\begin{array}{c}
K(\lambda,x_1,x_1)=\lambda G(x_1,x_1)m(x_1)\\
K(\lambda,x_1,x_2)=\lambda G(x_1,x_2)m(x_2)\\
\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\\
K(\lambda,x_1,x_n)=\lambda G(x_1,x_n)m(x_n)\\
K(\lambda,x_n,x_1)=\lambda G(x_n,x_1)m(x_1)\\
K(\lambda,x_n,x_2)=\lambda G(x_n,x_2)m(x_2)\\
\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\\
K(\lambda,x_n,x_n)=\lambda G(x_n,x_n)m(x_n)
\end{array}\right\}. \tag{9}$$

[illegible] $m(x) = const$, [illegible] $K(x,s)$ [illegible] (7) [illegible] (8) [illegible].

[illegible] $D(x)$, [illegible] [1]

$$D(\lambda) = 1 + \sum_{n=1}^{\infty} (-1)^n \frac{a_n(\lambda)}{n!}. \qquad (10)$$

[illegible] (10) [illegible] (8), [illegible] (7).

[illegible] $a_n(\lambda)$ [illegible]

$$a_n(\lambda) = \int_0^l \overset{n}{\cdots} \int_0^l \begin{vmatrix} K(\lambda, x_1, x_1) & K(\lambda, x_1, x_2) & \vdots & K(\lambda, x_1, x_n) \\ \cdots & \cdots & \cdots & \cdots \\ K(\lambda, x_n, x_1) & K(\lambda, x_n, x_2) & \vdots & K(\lambda, x_n, x_n) \end{vmatrix} dx_1 \ldots dx_n, \qquad (11)$$

[illegible] (11) [illegible] (9).

[illegible] (11) [illegible] (10) [illegible] $D(\lambda) = 0$.

[illegible] $m(x) = const$. [illegible] (5) [illegible] (7) [illegible].

[illegible] $a_n(\lambda)$ [illegible] $D(\lambda) = 0$, [illegible] $\lambda = p^2$, [illegible] p [illegible]. [illegible] n [illegible] (6) [illegible] n-[illegible] n [illegible].

[illegible] (6) [illegible]

$$1 - a_1 \lambda = 0, \qquad (12)$$

[illegible]

$$p_1 = \sqrt{\lambda} = \sqrt{\frac{1}{a_1}}. \qquad (13)$$

[illegible] (13) [illegible].

[illegible] (6) [illegible]

$$1 - a_1 \lambda + \frac{a_2}{2} \lambda^2 = 0. \qquad (14)$$

[illegible] (14) [illegible] $\lambda_{1,2} = \dfrac{a_1 \pm \sqrt{a_1^2 - 2a_2}}{a_2}$ [illegible]

$$p_1 = \sqrt{\frac{a_1 - \sqrt{a_1^2 - 2a_2}}{a_2}}, \qquad (15)$$

$$p_2 = \sqrt{\frac{a_1 + \sqrt{a_1^2 - 2a_2}}{a_2}}, \qquad (16)$$

[illegible] p_1 [illegible], [illegible] p_2 [illegible].

[illegible]:

$$1 - a_1\lambda + \frac{a_2}{2}\lambda^2 - \frac{a_3}{6}\lambda^3 = 0.$$

[illegible] n [illegible] $n = 1, 2, \ldots$ [illegible].

[illegible] (6) [illegible].

[illegible] $m(x)=const$ [illegible]

$$G(\bar{x},\bar{s}) = \frac{l^3}{EI}\int_0^{\bar{s}}(\bar{s}-\bar{u})(\bar{x}-\bar{u})d\bar{u} \quad [\text{illegible}] \quad \bar{x} \ge \bar{s}, \qquad (17)$$

[illegible] $\bar{x} = \frac{x}{l}$ – [illegible], EI – [illegible] l – [illegible] (17) [illegible]

$$G(\bar{x},\bar{s}) = \frac{l^3}{6EI}\bar{s}^2(3\bar{x}-\bar{s}) \quad [\text{illegible}] \quad \bar{x} \ge \bar{s}.$$

[illegible]

$$G(\bar{x},\bar{s}) = \frac{l^3}{6EI}\bar{x}^2(3\bar{s}-\bar{x}) \quad [\text{illegible}] \quad \bar{x} \le \bar{s}.$$

[illegible] a_1 [illegible] a_2.

[illegible] (7) [illegible] (8) [illegible]

$$a_1 = l\int_0^1 K(\bar{x},\bar{x})d\bar{x} = ml\int_0^1 G(\bar{x},\bar{x})d\bar{x} = \frac{ml^4}{3EI}\int_0^1 \bar{x}^3 d\bar{x}.$$

[illegible]

$$a_1 = \frac{1}{12}\frac{ml^4}{EI}. \qquad (18)$$

[illegible] (7) [illegible] (8), [illegible]

$$a_2 = l^2\int_0^1\int_0^1 \begin{vmatrix} K(\bar{x},\bar{x}) & K(\bar{x},\bar{s}) \\ K(\bar{s},\bar{x}) & K(\bar{s},\bar{s}) \end{vmatrix} d\bar{x}d\bar{s} =$$

$$m^2l^2\int_0^1\int_0^1 G(\bar{x},\bar{x})G(\bar{s},\bar{s})d\bar{x}d\bar{s} - m^2l^2\int_0^1\int_0^1 G(\bar{x},\bar{s})G(\bar{x},\bar{s})d\bar{x}d\bar{s} =$$

$$= m^2l^2\left[\int_0^1 G(\bar{x},\bar{x})d\bar{x}\right]^2 - m^2l^2\int_0^1\int_0^1\left[G(\bar{x},\bar{s})\right]^2 d\bar{x}d\bar{s} =$$

$$= \frac{m^2l^8}{9(EI)^2}\left[\int_0^1 \bar{x}^2 d\bar{x}\right]^2 - \frac{m^2l^8}{36(EI)^2}\int_0^1\left\{\int_0^{\bar{x}}\bar{s}^4(3\bar{x}-\bar{s})^2 d\bar{s} + \int_{\bar{s}}^1 \bar{x}^2(3\bar{s}-\bar{x})^2 d\bar{s}\right\}d\bar{x}.$$

[illegible]

$$a_2 = \frac{m^2l^8}{2520(EI)^2}. \qquad (19)$$

[illegible] (18) [illegible] (13) [illegible]

$$p_1 = \frac{3{,}46}{l^2}\sqrt{\frac{EI}{m}}. \qquad (20)$$

[illegible] (18) [illegible] (19) [illegible] (15) [illegible] (16)

$$p_1 = \frac{3{,}516}{l^2}\sqrt{\frac{EI}{m}}, \quad p_2 = \frac{20{,}19}{l^2}\sqrt{\frac{EI}{m}}. \qquad (21)$$

[illegible] [9], [illegible] n [illegible]

[illegible]

1. [illegible], 1972. – 416 [illegible]
2. [illegible], 1965. – 526 [illegible]
3. [illegible] 1986. – [illegible] 41, [illegible] 1. – [illegible] 171–178.
4. [illegible], 1989. – 448 [illegible]
5. [illegible], 1961. – 308 [illegible]
6. [illegible] 1974. – 257 [illegible]
7. [illegible] 1977. – 352 [illegible]
8. [illegible] 1986. – 736 [illegible]
9. [illegible] λ-[illegible] 2007. – 294 [illegible]
10. [illegible] 1996. – [illegible] 2. – [illegible] 120–131.
11. [illegible], 1989. – 184 [illegible]