?

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?

??

???$t[a_1(t), a_2(t)...a_9(t)]$

$$u(x,t) = \sum_{j=1}^{9} a_j(t) u_j(x),$$

(1)

$$u_1 = \sqrt{2} sin(\frac{\pi y}{2})00, u_2 = \frac{4}{\sqrt{3}} cos^2(\frac{\pi y}{2}) cos(\gamma z)00,$$

$$u_3 = \frac{2}{\sqrt{4\gamma^2 + \pi^2}} 02\gamma cos(\frac{\pi y}{2}) cos(\gamma z) \pi sin(\frac{\pi y}{2}) sin(\gamma z), u_4 = 00\frac{4}{\sqrt{3}} cos^2(\frac{\pi y}{2}) cos(\alpha x),$$

$$u_5 = 002 sin(\alpha x) sin(\frac{\pi y}{2}), u_6 = \frac{4\sqrt{2}}{\sqrt{3(\alpha^2+\gamma^2)}} - \gamma cos(\alpha x) cos^2(\frac{\pi y}{2}) sin(\gamma z) 0 \alpha sin(\alpha x) cos^2(\frac{\pi y}{2}) cos(\gamma z),$$

$$u_7 = \frac{2\sqrt{2}}{\sqrt{(\alpha^2+\gamma^2)}} \gamma sin(\alpha x) sin(\frac{\pi y}{2}) sin(\gamma z) 0 \alpha cos(\alpha x) sin(\frac{\pi y}{2}) cos(\gamma z), u_8 = N_8 \pi \alpha sin(\alpha x) sin(\frac{\pi y}{2}) sin(\gamma z) 2(\alpha^2+\gamma^2) cos(\alpha x$$

$$u_9 = \sqrt{2} sin(\frac{3\pi y}{2})00$$

$a(t) =$
$[a_1(t), a_2(t), ..., a_8(t), a_9(t)]^T t+$
$\triangle t a(t+$
$\triangle t)$
????
$Re =$
678?

??

??

??$y =$
-0.5

$$u_k = [u_{k1}, u_{k2}, ..., u_{kn}], k = 1...m$$

(2)

$144\times$
$576 =$
82944

$$\overline{u} = \frac{1}{m} \sum_{1}^{m} u_m$$

(3)

$u'_m =$
$u_m -$
$\overline{u} U$

$$U = u'_1 u'_2 u'_3{}' u'_m = u'_{11} u'_{12} u'_{13} \cdots u'_{1n} u'_{21} u'_{22} u'_{23} \cdots u'_{2n} u'_{31} u'_{32} u'_{33} \cdots u'_{3n} u'_{m1} u'_{m2} u'_{m3} \cdots u'_{mn}$$

$$C = \frac{1}{m-1} U^T U = \frac{1}{m-1} \sum_{i=1}^{m} {u'_{i1}}^2 \cdots \frac{1}{m-1} \sum_{i=1}^{m} {u'_{i2}}^2 \cdots\cdots\cdots\cdots \frac{1}{m-1} \sum_{i=1}^{m} {u'_{i3}}^2 \cdots\cdots\cdots\cdots\cdots \frac{1}{m-1} \sum_{i=1}^{m} {u'_{in}}^2$$

$$TKE = \frac{1}{n} \sum_{i=1}^{n} \frac{1}{m-1} \sum_{j=1}^{m} {u'_{ij}}^2$$

(4)

$C^{n\times n} C$
??$CC =$
$\Phi \Lambda \Phi^T \Phi U \Phi A$

$$A^{m\times n} = U^{m\times n} \Phi^{n\times n}$$

$$\frac{AU\Lambda U}{m-1 A^T A = \frac{1}{m-1}(U\Phi)^T(U\Phi) = \frac{1}{m-1}(\Phi^T U^T U \Phi) = \Phi^T C \Phi = \Phi^T \Phi \Lambda \Phi^T \Phi = \Lambda = \lambda_1 \lambda_2 \lambda_3 \ \lambda_n}$$