In[1]:= $J = \{\{1 + \frac{Tan[\alpha]^2}{4}, 0, 0\}, \{0, 1 + \frac{Tan[\alpha]^2}{4}, 0\}, \{0, 0, \frac{Tan[\alpha]^2}{2}\}\}$

```
R = RotationMatrix[α, {0, 1, 0}]
```

Out[1]= $\{\{1 + \frac{Tan[\alpha]^2}{4}, 0, 0\}, \{0, 1 + \frac{Tan[\alpha]^2}{4}, 0\}, \{0, 0, \frac{Tan[\alpha]^2}{2}\}\}$

Out[2]= $\{\{Cos[\alpha], 0, Sin[\alpha]\}, \{0, 1, 0\}, \{-Sin[\alpha], 0, Cos[\alpha]\}\}$

In[3]:=
```
J1 = R.J.Transpose[R]
```

Out[3]= $\{\{\frac{1}{2} Sin[\alpha]^2 Tan[\alpha]^2 + Cos[\alpha]^2 \left(1 + \frac{Tan[\alpha]^2}{4}\right), 0, \frac{1}{2} Sin[\alpha]^2 Tan[\alpha] - Cos[\alpha] Sin[\alpha] \left(1 + \frac{Tan[\alpha]^2}{4}\right)\}, \{0, 1 + \frac{Tan[\alpha]^2}{4}, 0\}, \{\frac{1}{2} Sin[\alpha]^2 Tan[\alpha] - Cos[\alpha] Sin[\alpha] \left(1 + \frac{Tan[\alpha]^2}{4}\right), 0, \frac{Sin[\alpha]^2}{2} + Sin[\alpha]^2 \left(1 + \frac{Tan[\alpha]^2}{4}\right)\}\}$

In[4]:=
```
MatrixForm[J1]
```

Out[4]//MatrixForm=

$$\begin{pmatrix} \frac{1}{2} Sin[\alpha]^2 Tan[\alpha]^2 + Cos[\alpha]^2 \left(1 + \frac{Tan[\alpha]^2}{4}\right) & 0 & \frac{1}{2} Sin[\alpha]^2 Tan[\alpha] - Cos[\alpha] Sin[\alpha] \left(1 \right. \\ 0 & 1 + \frac{Tan[\alpha]^2}{4} & 0 \\ \frac{1}{2} Sin[\alpha]^2 Tan[\alpha] - Cos[\alpha] Sin[\alpha] \left(1 + \frac{Tan[\alpha]^2}{4}\right) & 0 & \frac{Sin[\alpha]^2}{2} + Sin[\alpha]^2 \left(1 + \frac{Tan[\alpha]^2}{4}\right) \end{pmatrix}$$

In[5]:=
```
Eigensystem[J1] // Simplify
```

Out[5]= $\{\{\frac{Tan[\alpha]^2}{2}, \frac{1}{4}\left(4 + Tan[\alpha]^2\right), \frac{1}{4}\left(4 + Tan[\alpha]^2\right)\}, \{\{Tan[\alpha], 0, 1\}, \{-Cot[\alpha], 0, 1\}, \{0, 1, 0\}\}\}$

In[8]:= $\Omega = \begin{matrix} 0 \\ 0 \\ 2\frac{\pi}{\tau\, Tan[\alpha]} \end{matrix}$

Out[8]= $\{\{0\}, \{0\}, \{\frac{2\pi Cot[\alpha]}{\tau}\}\}$

In[15]:= $\rho\ h^3\ \frac{Tan[\alpha]^2}{5} J1.\Omega$ // Simplify

In[16]:= $\{\{-\frac{h^3 \pi \rho \left(3 + 5 Cos[2\alpha]\right) Tan[\alpha]^2}{20\tau}\}, \{0\}, \{\frac{h^3 \pi \rho \left(7 + 5 Cos[2\alpha]\right) Tan[\alpha]^3}{20\tau}\}\}$

$\rho\ h^3\ \frac{Tan[\alpha]^2}{5}$ Transpose[Ω]. J1.Ω // Simplify

Out[16]= $\{\{-\frac{h^3 \pi \rho \left(3 + 5 Cos[2\alpha]\right) Tan[\alpha]^2}{20\tau}\}, \{0\}, \{\frac{h^3 \pi \rho \left(7 + 5 Cos[2\alpha]\right) Tan[\alpha]^3}{20\tau}\}\}$

Out[17]= $\{\{\frac{h^3 \pi^2 \rho \left(7 + 5 Cos[2\alpha]\right) Tan[\alpha]^2}{10\tau^2}\}\}$