

$$M := \begin{bmatrix} 4.2830 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 4.2830 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.12700 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 5 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 5 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.10000 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 122.35 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 122.35 \end{bmatrix}$$

$$K := \begin{bmatrix} 2.000010^{10} & 0. & 0. & -1.000010^{10} & 0. & 1.915110^9 & 0. & 0. \\ 0. & 2.000010^{10} & 0. & 0. & -1.000010^{10} & 1.607010^9 & 0. & 0. \\ 0. & 0. & 1.513210^7 & -2.691510^8 & -5.644310^7 & 6.061510^7 & 0. & 0. \\ -1.000010^{10} & 0. & -2.691510^8 & 2.000010^{10} & 0. & 0. & -1.000010^{10} & 0. \\ 0. & -1.000010^{10} & -5.644310^7 & 0. & 2.000010^{10} & 0. & 0. & -1.000010^{10} \\ 1.915110^9 & 1.607010^9 & 6.061510^7 & 0. & 0. & 1.250010^9 & -1.915110^9 & -1.607010^9 \\ 0. & 0. & 0. & -1.000010^{10} & 0. & -1.915110^9 & 1.000010^{10} & 0. \\ 0. & 0. & 0. & 0. & -1.000010^{10} & -1.607010^9 & 0. & 1.000010^{10} \end{bmatrix}$$

> DD := simplify(MatrixMatrixMultiply(MatrixInverse(M),K));

$$DD := \begin{bmatrix} 4.669610^9 & 0. & 0. & -2.334810^9 & 0. & 4.471410^8 & 0. & 0. \\ 0. & 4.669610^9 & 0. & 0. & -2.334810^9 & 3.752010^8 & 0. & 0. \\ 0. & 0. & 1.191510^8 & -2.119310^9 & -4.444310^8 & 4.772810^8 & 0. & 0. \\ -2.000010^9 & 0. & -5.383010^7 & 4.000010^9 & 0. & 0. & -2.000010^9 & 0. \\ 0. & -2.000010^9 & -1.128910^7 & 0. & 4.000010^9 & 0. & 0. & -2.000010^9 \\ 1.915110^{10} & 1.607010^{10} & 6.061510^8 & 0. & 0. & 1.250010^{10} & -1.915110^{10} & -1.607010^{10} \\ 0. & 0. & 0. & -8.173310^7 & 0. & -1.565310^7 & 8.173310^7 & 0. \\ 0. & 0. & 0. & 0. & -8.173310^7 & -1.313410^7 & 0. & 8.173310^7 \end{bmatrix}$$

> solve(Determinant(K-omega^2*M)=0,omega);

1.5550, 1.4209 + 0.63219I, 1.0404 + 1.1545I, 0.48105 + 1.4788I,
-0.16084 + 1.5453I, -0.77713 + 1.3469I, -1.2580 + 0.91497I,
-1.5216 + 0.32381I, -239.76, -1.5216 - 0.32381I, -1.2580
- 0.91497I, -0.77713 - 1.3469I, -0.16084 - 1.5453I, 0.48105
- 1.4788I, 1.0404 - 1.1545I, 1.4209 - 0.63219I

> solve(Determinant(DD-omega^2*IdentityMatrix(8))=0,omega);

1.4996, 1.3692 + 0.60982I, 1.0033 + 1.1141I, 0.46303 + 1.4244I,
-0.15653 + 1.4900I, -0.74886 + 1.2987I, -1.2124 + 0.88172I,
-1.4669 + 0.31204I, -500.98, -1.4669 - 0.31204I, -1.2124
- 0.88172I, -0.74886 - 1.2987I, -0.15653 - 1.4900I, 0.46303
- 1.4244I, 1.0033 - 1.1141I, 1.3692 - 0.60982I

> simplify(Eigenvalues(DD));

$$\begin{bmatrix} 1.4170 \cdot 10^{10} \\ 6.5340 \cdot 10^9 \\ 5.6117 \cdot 10^9 \\ 2.2000 \cdot 10^9 \\ 1.5628 \cdot 10^9 \\ 4.3787 \cdot 10^7 \\ 30291. \\ -215.56 \end{bmatrix}$$