$$a_{11}x^2 + a_{22}y^2 + a_{33}z^2 + 2a_{12}xy + 2a_{13}xz + 2a_{23}yz + 2a_{14}x + 2a_{24}y + 2a_{34}z + a_{44} = 0$$

$$I_4 = \begin{vmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{vmatrix} \qquad I_3 = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

$$I_2 = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} + \begin{vmatrix} a_{11} & a_{13} \\ a_{31} & a_{33} \end{vmatrix} + \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix}$$

$$I_1 = a_{11} + a_{22} + a_{33}$$

$$S_3 = \begin{vmatrix} a_{11} & a_{12} & a_{14} \\ a_{21} & a_{22} & a_{24} \\ a_{41} & a_{42} & a_{44} \end{vmatrix} + \begin{vmatrix} a_{11} & a_{13} & a_{14} \\ a_{31} & a_{33} & a_{34} \\ a_{41} & a_{43} & a_{44} \end{vmatrix} + \begin{vmatrix} a_{22} & a_{23} & a_{24} \\ a_{32} & a_{33} & a_{34} \\ a_{42} & a_{43} & a_{44} \end{vmatrix}$$

$$S_2 = \begin{vmatrix} a_{11} & a_{14} \\ a_{41} & a_{44} \end{vmatrix} + \begin{vmatrix} a_{22} & a_{24} \\ a_{42} & a_{44} \end{vmatrix} + \begin{vmatrix} a_{33} & a_{34} \\ a_{43} & a_{44} \end{vmatrix}$$

(1) $\underline{I}_3 \neq 0$

$\underline{I}_2 > 0 \quad \underline{I}_1 \underline{I}_3 > 0 \quad \underline{I}_4 < 0$ elipsoid

$\underline{I}_2 > 0 \quad \underline{I}_1 \underline{I}_3 > 0 \quad \underline{I}_4 = 0$ bod

$\underline{I}_2 > 0 \quad \underline{I}_1 \underline{I}_3 > 0 \quad \underline{I}_4 > 0$ $\emptyset$

$\underline{I}_2 \leq 0$ nebo $\underline{I}_1 \underline{I}_2 \leq 0$

$\underline{I}_4 > 0$ jednodílný hyperboloid

$\underline{I}_4 < 0$ dvoudílný hyperboloid

$\underline{I}_4 = 0$ kuželová plocha

(2) $\underline{I}_3 = 0 \quad \underline{I}_4 \neq 0 \quad \underline{I}_4 < 0$ eliptický paraboloid

$\underline{I}_4 > 0$ hyperbolický paraboloid

(3) $\underline{I}_3 = 0 \quad \underline{I}_4 = 0 \quad \underline{I}_2 \neq 0$

$\underline{I}_2 > 0 \quad \underline{I}_1 S_3 < 0$ eliptická VP

$\underline{I}_2 < 0 \quad S_3 \neq 0$ hyperbolická VP

$\underline{I}_2 > 0 \quad S_2 = 0$ přímka

$\underline{I}_2 > 0 \quad \underline{I}_1 S_2 > 0$ $\emptyset$

$\underline{I}_2 < 0 \quad S_3 = 0$ 2 různoběžné roviny

(4) $\underline{I}_2 = \underline{I}_3 = \underline{I}_4 = 0 \quad S_3 \neq 0$ parabolická VP

(5) $\underline{I}_2 = \underline{I}_3 = \underline{I}_4 = S_3 = 0$

$S_2 < 0$ 2 rovnoběžné roviny

$S_2 = 0$ rovina

$S_2 < 0$ $\emptyset$