Rotation of trihedron along the curve

A C curve is given by parametric equation **r**=**r**(u) (in vector view). In every point, which is on the C curve, vectors tangent **t**, normal **n** and binormal **b** are determined (as column-vectors). These vectors form trihedron.
However, in singularity point |**t**|=0 and to determine trihedron correctly impossibly if standard methods are used.
Following method used in new algorithm.
Trihedron {**t***, **n***, **b***} computes in point which is next to singularity point. In singularity point tangent vector **t** computed (by Taylor-series or by three-point approximation). For searching **n** and **b** vectors we rotate the trihedron {**t***, **n***, **b***} to coincide of **t** and **t*** vectors. Vectors **n** and **b** ensue as result of rotation **n*** and **b*** accordingly.
Trihedron turns around axe $\vec{p} = \frac{\left[\vec{t}^*;\vec{t}\right]}{\left\|\left[\vec{t}^*;\vec{t}\right]\right\|}$ (i.e. $\left\|\vec{p}\right\| \equiv 1$). Rotation angle is angle between **t** and **t*** vectors (let us use the symbol γ for this angle).
Rotating an **t*** vector is combining of following transformations:

1. Coinciding of **p-** and **Z**-axes:

1.1. Rotate **p** around X-axes (to coincide of **p** and **XOZ**-plane). Rotation angle is α, where $\cos\alpha = \frac{p_z}{\sqrt{p_y^2 + p_z^2}}$, $\sin\alpha = \frac{p_y}{\sqrt{p_y^2 + p_z^2}}$. Rotation matrix is

$$T_1 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos\alpha & -\sin\alpha \\ 0 & \sin\alpha & \cos\alpha \end{pmatrix}$$

1.2. Rotate $T_1\vec{p}$ around Y-axes. Rotation angle is β, where $\cos\beta = \sqrt{p_y^2 + p_z^2}$, $\sin\beta = p_x$. Rotation matrix is

$$T_2 = \begin{pmatrix} \cos\beta & 0 & -\sin\beta \\ 0 & 1 & 0 \\ \sin\beta & 0 & \cos\beta \end{pmatrix}$$

2. Rotating an $T_2 T_1 \vec{t}^*$ around **Z**-axe to γ angle. Rotation matrix is

$$T_3 = \begin{pmatrix} \cos\gamma & -\sin\gamma & 0 \\ \sin\gamma & \cos\gamma & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

3. Return vector **p** to previous position. Rotation matrix is

$$T_4 = T_1^{-1} T_2^{-1}.$$

Summarize transform matrix is

$$T = T_4 T_3 T_2 T_1.$$

New tangent vector is $T \cdot \vec{t}^*$, new normal vector is $T \cdot \vec{n}^*$, new binormal vector is $T \cdot \vec{b}^*$.
After simplifying T matrix may rewritten as

$$T = \begin{pmatrix} (1-\cos\gamma)p_x^2 + \cos\gamma & (1-\cos\gamma)p_x p_y - p_z \cdot \sin\gamma & (1-\cos\gamma)p_x p_z + p_y \cdot \sin\gamma \\ (1-\cos\gamma)p_x p_y + p_z \cdot \sin\gamma & (1-\cos\gamma)p_y^2 + \cos\gamma & (1-\cos\gamma)p_y p_z - p_x \cdot \sin\gamma \\ (1-\cos\gamma)p_x p_z - p_y \cdot \sin\gamma & (1-\cos\gamma)p_y p_z + p_x \cdot \sin\gamma & (1-\cos\gamma)p_z^2 + \cos\gamma \end{pmatrix}$$