

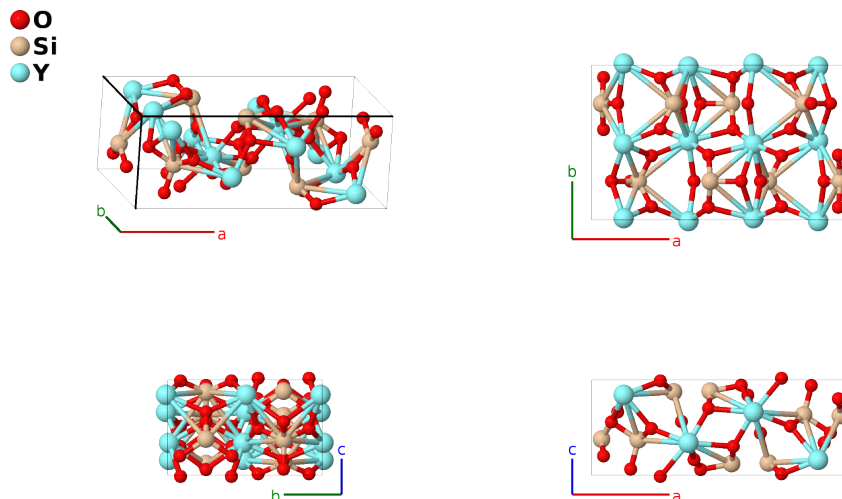
Possible δ -Y₂Si₂O₇ Structure: A7B2C2_oP44_62_3c2d_2c_d-001

This structure originally had the label A7B2C2_oP44_62_3c2d_2c_d. Calls to that address will be redirected here.

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<https://aflow.org/p/Y82X>

https://aflow.org/p/A7B2C2_oP44_62_3c2d_2c_d-001



Prototype	O ₇ Si ₂ Y ₂
AFLOW prototype label	A7B2C2_oP44_62_3c2d_2c_d-001
ICSD	33721
Pearson symbol	oP44
Space group number	62
Space group symbol	<i>Pnma</i>
AFLOW prototype command	<code>aflow --proto=A7B2C2_oP44_62_3c2d_2c_d-001 --params=a, b/a, c/a, x₁, z₁, x₂, z₂, x₃, z₃, x₄, z₄, x₅, z₅, x₆, y₆, z₆, x₇, y₇, z₇, x₈, y₈, z₈</code>

Other compounds with this structure

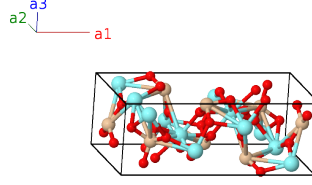
δ -Ho₂O₇Si₂, δ -Dy₂O₇Si₂, δ -Y₂O₇Si₂, Li₂S₂O₇

- (Diaz, 1990) found that some structures of RE₂O₇Si₂ (RE = Ho, Dy, Gd, Y) were in the centro-symmetric orthorhombic *Pnma* #62 space group, in which case this would be the prototype of δ -RE₂O₇Si₂ (Becerro, 2004).
- (Smolin, 1970) found δ -Gd₂O₇Si₂ to be in the non-centro-symmetric *Pna2*₁ #33 space group.
- (Becerro, 2004) found only one yttrium site in the δ -structure, supporting (Diaz, 1990).
- In addition if we allow a small amount of uncertainty (0.2Å) in the atomic positions in the *Pna2*₁ structure findsym places this structure in the *Pnma* group.

- Nevertheless we have found no work explicitly stating that the structure of (Smolin, 1970) is in error, and indeed (Christensen, 1994) found δ -Y₂O₇Si₂ in space group $Pna2_1$. Given this ambiguity, we list Y₂O₇Si₂ only as a possible prototype for the δ -phase pyrosilicates.

Simple Orthorhombic primitive vectors

$$\begin{aligned}\mathbf{a}_1 &= a \hat{\mathbf{x}} \\ \mathbf{a}_2 &= b \hat{\mathbf{y}} \\ \mathbf{a}_3 &= c \hat{\mathbf{z}}\end{aligned}$$



Basis vectors

	Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
\mathbf{B}_1	$= x_1 \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 + z_1 \mathbf{a}_3$	$=$	$ax_1 \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} + cz_1 \hat{\mathbf{z}}$	(4c)	O I
\mathbf{B}_2	$= -(x_1 - \frac{1}{2}) \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + (z_1 + \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(x_1 - \frac{1}{2}) \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} + c(z_1 + \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	O I
\mathbf{B}_3	$= -x_1 \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 - z_1 \mathbf{a}_3$	$=$	$-ax_1 \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} - cz_1 \hat{\mathbf{z}}$	(4c)	O I
\mathbf{B}_4	$= (x_1 + \frac{1}{2}) \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 - (z_1 - \frac{1}{2}) \mathbf{a}_3$	$=$	$a(x_1 + \frac{1}{2}) \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} - c(z_1 - \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	O I
\mathbf{B}_5	$= x_2 \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 + z_2 \mathbf{a}_3$	$=$	$ax_2 \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} + cz_2 \hat{\mathbf{z}}$	(4c)	O II
\mathbf{B}_6	$= -(x_2 - \frac{1}{2}) \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + (z_2 + \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(x_2 - \frac{1}{2}) \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} + c(z_2 + \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	O II
\mathbf{B}_7	$= -x_2 \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 - z_2 \mathbf{a}_3$	$=$	$-ax_2 \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} - cz_2 \hat{\mathbf{z}}$	(4c)	O II
\mathbf{B}_8	$= (x_2 + \frac{1}{2}) \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 - (z_2 - \frac{1}{2}) \mathbf{a}_3$	$=$	$a(x_2 + \frac{1}{2}) \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} - c(z_2 - \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	O II
\mathbf{B}_9	$= x_3 \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 + z_3 \mathbf{a}_3$	$=$	$ax_3 \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} + cz_3 \hat{\mathbf{z}}$	(4c)	O III
\mathbf{B}_{10}	$= -(x_3 - \frac{1}{2}) \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + (z_3 + \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(x_3 - \frac{1}{2}) \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} + c(z_3 + \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	O III
\mathbf{B}_{11}	$= -x_3 \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 - z_3 \mathbf{a}_3$	$=$	$-ax_3 \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} - cz_3 \hat{\mathbf{z}}$	(4c)	O III
\mathbf{B}_{12}	$= (x_3 + \frac{1}{2}) \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 - (z_3 - \frac{1}{2}) \mathbf{a}_3$	$=$	$a(x_3 + \frac{1}{2}) \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} - c(z_3 - \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	O III
\mathbf{B}_{13}	$= x_4 \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 + z_4 \mathbf{a}_3$	$=$	$ax_4 \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} + cz_4 \hat{\mathbf{z}}$	(4c)	Si I
\mathbf{B}_{14}	$= -(x_4 - \frac{1}{2}) \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + (z_4 + \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(x_4 - \frac{1}{2}) \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} + c(z_4 + \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	Si I
\mathbf{B}_{15}	$= -x_4 \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 - z_4 \mathbf{a}_3$	$=$	$-ax_4 \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} - cz_4 \hat{\mathbf{z}}$	(4c)	Si I
\mathbf{B}_{16}	$= (x_4 + \frac{1}{2}) \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 - (z_4 - \frac{1}{2}) \mathbf{a}_3$	$=$	$a(x_4 + \frac{1}{2}) \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} - c(z_4 - \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	Si I
\mathbf{B}_{17}	$= x_5 \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 + z_5 \mathbf{a}_3$	$=$	$ax_5 \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} + cz_5 \hat{\mathbf{z}}$	(4c)	Si II
\mathbf{B}_{18}	$= -(x_5 - \frac{1}{2}) \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + (z_5 + \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(x_5 - \frac{1}{2}) \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} + c(z_5 + \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	Si II
\mathbf{B}_{19}	$= -x_5 \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 - z_5 \mathbf{a}_3$	$=$	$-ax_5 \hat{\mathbf{x}} + \frac{3}{4}b \hat{\mathbf{y}} - cz_5 \hat{\mathbf{z}}$	(4c)	Si II
\mathbf{B}_{20}	$= (x_5 + \frac{1}{2}) \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 - (z_5 - \frac{1}{2}) \mathbf{a}_3$	$=$	$a(x_5 + \frac{1}{2}) \hat{\mathbf{x}} + \frac{1}{4}b \hat{\mathbf{y}} - c(z_5 - \frac{1}{2}) \hat{\mathbf{z}}$	(4c)	Si II
\mathbf{B}_{21}	$= x_6 \mathbf{a}_1 + y_6 \mathbf{a}_2 + z_6 \mathbf{a}_3$	$=$	$ax_6 \hat{\mathbf{x}} + by_6 \hat{\mathbf{y}} + cz_6 \hat{\mathbf{z}}$	(8d)	O IV
\mathbf{B}_{22}	$= -(x_6 - \frac{1}{2}) \mathbf{a}_1 - y_6 \mathbf{a}_2 + (z_6 + \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(x_6 - \frac{1}{2}) \hat{\mathbf{x}} - by_6 \hat{\mathbf{y}} + c(z_6 + \frac{1}{2}) \hat{\mathbf{z}}$	(8d)	O IV
\mathbf{B}_{23}	$= -x_6 \mathbf{a}_1 + (y_6 + \frac{1}{2}) \mathbf{a}_2 - z_6 \mathbf{a}_3$	$=$	$-ax_6 \hat{\mathbf{x}} + b(y_6 + \frac{1}{2}) \hat{\mathbf{y}} - cz_6 \hat{\mathbf{z}}$	(8d)	O IV

$$\begin{aligned}
\mathbf{B}_{24} &= \begin{pmatrix} x_6 + \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \mathbf{a}_1 - \begin{pmatrix} y_6 - \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \mathbf{a}_2 - \mathbf{a}_3 &= a \begin{pmatrix} x_6 + \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} - b \begin{pmatrix} y_6 - \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} - c \begin{pmatrix} z_6 - \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{O IV} \\
\mathbf{B}_{25} &= -x_6 \mathbf{a}_1 - y_6 \mathbf{a}_2 - z_6 \mathbf{a}_3 &= -ax_6 \hat{\mathbf{x}} - by_6 \hat{\mathbf{y}} - cz_6 \hat{\mathbf{z}} & (8d) & \text{O IV} \\
\mathbf{B}_{26} &= \begin{pmatrix} x_6 + \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \mathbf{a}_1 + y_6 \mathbf{a}_2 - \begin{pmatrix} z_6 - \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \mathbf{a}_3 &= a \begin{pmatrix} x_6 + \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} + by_6 \hat{\mathbf{y}} - c \begin{pmatrix} z_6 - \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{O IV} \\
\mathbf{B}_{27} &= x_6 \mathbf{a}_1 - \begin{pmatrix} y_6 - \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \mathbf{a}_2 + z_6 \mathbf{a}_3 &= ax_6 \hat{\mathbf{x}} - b \begin{pmatrix} y_6 - \frac{1}{2} \\ z_6 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} + cz_6 \hat{\mathbf{z}} & (8d) & \text{O IV} \\
\mathbf{B}_{28} &= -\begin{pmatrix} x_6 - \frac{1}{2} \\ z_6 + \frac{1}{2} \end{pmatrix} \mathbf{a}_1 + \begin{pmatrix} y_6 + \frac{1}{2} \\ z_6 + \frac{1}{2} \end{pmatrix} \mathbf{a}_2 + \mathbf{a}_3 &= -a \begin{pmatrix} x_6 - \frac{1}{2} \\ z_6 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} + b \begin{pmatrix} y_6 + \frac{1}{2} \\ z_6 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} + c \begin{pmatrix} z_6 + \frac{1}{2} \\ z_6 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{O IV} \\
\mathbf{B}_{29} &= x_7 \mathbf{a}_1 + y_7 \mathbf{a}_2 + z_7 \mathbf{a}_3 &= ax_7 \hat{\mathbf{x}} + by_7 \hat{\mathbf{y}} + cz_7 \hat{\mathbf{z}} & (8d) & \text{O V} \\
\mathbf{B}_{30} &= -\begin{pmatrix} x_7 - \frac{1}{2} \\ z_7 + \frac{1}{2} \end{pmatrix} \mathbf{a}_1 - y_7 \mathbf{a}_2 + \mathbf{a}_3 &= -a \begin{pmatrix} x_7 - \frac{1}{2} \\ z_7 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} - by_7 \hat{\mathbf{y}} + c \begin{pmatrix} z_7 + \frac{1}{2} \\ z_7 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{O V} \\
\mathbf{B}_{31} &= -x_7 \mathbf{a}_1 + \begin{pmatrix} y_7 + \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \mathbf{a}_2 - z_7 \mathbf{a}_3 &= -ax_7 \hat{\mathbf{x}} + b \begin{pmatrix} y_7 + \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} - cz_7 \hat{\mathbf{z}} & (8d) & \text{O V} \\
\mathbf{B}_{32} &= \begin{pmatrix} x_7 + \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \mathbf{a}_1 - \begin{pmatrix} y_7 - \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \mathbf{a}_2 - \mathbf{a}_3 &= a \begin{pmatrix} x_7 + \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} - b \begin{pmatrix} y_7 - \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} - c \begin{pmatrix} z_7 - \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{O V} \\
\mathbf{B}_{33} &= -x_7 \mathbf{a}_1 - y_7 \mathbf{a}_2 - z_7 \mathbf{a}_3 &= -ax_7 \hat{\mathbf{x}} - by_7 \hat{\mathbf{y}} - cz_7 \hat{\mathbf{z}} & (8d) & \text{O V} \\
\mathbf{B}_{34} &= \begin{pmatrix} x_7 + \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \mathbf{a}_1 + y_7 \mathbf{a}_2 - \begin{pmatrix} z_7 - \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \mathbf{a}_3 &= a \begin{pmatrix} x_7 + \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} + by_7 \hat{\mathbf{y}} - c \begin{pmatrix} z_7 - \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{O V} \\
\mathbf{B}_{35} &= x_7 \mathbf{a}_1 - \begin{pmatrix} y_7 - \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \mathbf{a}_2 + z_7 \mathbf{a}_3 &= ax_7 \hat{\mathbf{x}} - b \begin{pmatrix} y_7 - \frac{1}{2} \\ z_7 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} + cz_7 \hat{\mathbf{z}} & (8d) & \text{O V} \\
\mathbf{B}_{36} &= -\begin{pmatrix} x_7 - \frac{1}{2} \\ z_7 + \frac{1}{2} \end{pmatrix} \mathbf{a}_1 + \begin{pmatrix} y_7 + \frac{1}{2} \\ z_7 + \frac{1}{2} \end{pmatrix} \mathbf{a}_2 + \mathbf{a}_3 &= -a \begin{pmatrix} x_7 - \frac{1}{2} \\ z_7 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} + b \begin{pmatrix} y_7 + \frac{1}{2} \\ z_7 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} + c \begin{pmatrix} z_7 + \frac{1}{2} \\ z_7 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{O V} \\
\mathbf{B}_{37} &= x_8 \mathbf{a}_1 + y_8 \mathbf{a}_2 + z_8 \mathbf{a}_3 &= ax_8 \hat{\mathbf{x}} + by_8 \hat{\mathbf{y}} + cz_8 \hat{\mathbf{z}} & (8d) & \text{Y I} \\
\mathbf{B}_{38} &= -\begin{pmatrix} x_8 - \frac{1}{2} \\ z_8 + \frac{1}{2} \end{pmatrix} \mathbf{a}_1 - y_8 \mathbf{a}_2 + \mathbf{a}_3 &= -a \begin{pmatrix} x_8 - \frac{1}{2} \\ z_8 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} - by_8 \hat{\mathbf{y}} + c \begin{pmatrix} z_8 + \frac{1}{2} \\ z_8 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{Y I} \\
\mathbf{B}_{39} &= -x_8 \mathbf{a}_1 + \begin{pmatrix} y_8 + \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \mathbf{a}_2 - z_8 \mathbf{a}_3 &= -ax_8 \hat{\mathbf{x}} + b \begin{pmatrix} y_8 + \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} - cz_8 \hat{\mathbf{z}} & (8d) & \text{Y I} \\
\mathbf{B}_{40} &= \begin{pmatrix} x_8 + \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \mathbf{a}_1 - \begin{pmatrix} y_8 - \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \mathbf{a}_2 - \mathbf{a}_3 &= a \begin{pmatrix} x_8 + \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} - b \begin{pmatrix} y_8 - \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} - c \begin{pmatrix} z_8 - \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{Y I} \\
\mathbf{B}_{41} &= -x_8 \mathbf{a}_1 - y_8 \mathbf{a}_2 - z_8 \mathbf{a}_3 &= -ax_8 \hat{\mathbf{x}} - by_8 \hat{\mathbf{y}} - cz_8 \hat{\mathbf{z}} & (8d) & \text{Y I} \\
\mathbf{B}_{42} &= \begin{pmatrix} x_8 + \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \mathbf{a}_1 + y_8 \mathbf{a}_2 - \begin{pmatrix} z_8 - \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \mathbf{a}_3 &= a \begin{pmatrix} x_8 + \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} + by_8 \hat{\mathbf{y}} - c \begin{pmatrix} z_8 - \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{Y I} \\
\mathbf{B}_{43} &= x_8 \mathbf{a}_1 - \begin{pmatrix} y_8 - \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \mathbf{a}_2 + z_8 \mathbf{a}_3 &= ax_8 \hat{\mathbf{x}} - b \begin{pmatrix} y_8 - \frac{1}{2} \\ z_8 - \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} + cz_8 \hat{\mathbf{z}} & (8d) & \text{Y I} \\
\mathbf{B}_{44} &= -\begin{pmatrix} x_8 - \frac{1}{2} \\ z_8 + \frac{1}{2} \end{pmatrix} \mathbf{a}_1 + \begin{pmatrix} y_8 + \frac{1}{2} \\ z_8 + \frac{1}{2} \end{pmatrix} \mathbf{a}_2 + \mathbf{a}_3 &= -a \begin{pmatrix} x_8 - \frac{1}{2} \\ z_8 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{x}} + b \begin{pmatrix} y_8 + \frac{1}{2} \\ z_8 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{y}} + c \begin{pmatrix} z_8 + \frac{1}{2} \\ z_8 + \frac{1}{2} \end{pmatrix} \hat{\mathbf{z}} & (8d) & \text{Y I}
\end{aligned}$$

References

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