3D numerical

Reflect a prism A(0,0,0), B(1,1,0), C(1,2,2) and D(0,2,0) about yz plane which has been rotated previously with +90 degrees about y-axis using composite matrix

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To reflect the prism about the 𝑦𝑧*yz*-plane after it has been rotated by +90∘+90∘ about the 𝑦*y*-axis, we can use a composite transformation matrix. This matrix will combine the rotation matrix and the reflection matrix.

The rotation matrix for a rotation of +90∘+90∘ about the 𝑦*y*-axis is:

[00−1010100]⎣⎡​001​010​−100​⎦⎤​

The reflection matrix for reflecting about the 𝑦𝑧*yz*-plane is:

[−100010001]⎣⎡​−100​010​001​⎦⎤​

To find the composite transformation matrix, we multiply these two matrices:

[00−1010100][−100010001]=[001010−100]⎣⎡​001​010​−100​⎦⎤​⎣⎡​−100​010​001​⎦⎤​=⎣⎡​00−1​010​100​⎦⎤​

Now, we apply this composite transformation matrix to each vertex of the prism:

For vertex A(0,0,0):

[001010−100][000]=[000]⎣⎡​00−1​010​100​⎦⎤​⎣⎡​000​⎦⎤​=⎣⎡​000​⎦⎤​

For vertex B(1,1,0):

[001010−100][110]=[01−1]⎣⎡​00−1​010​100​⎦⎤​⎣⎡​110​⎦⎤​=⎣⎡​01−1​⎦⎤​

For vertex C(1,2,2):

[001010−100][122]=[22−1]⎣⎡​00−1​010​100​⎦⎤​⎣⎡​122​⎦⎤​=⎣⎡​22−1​⎦⎤​

For vertex D(0,2,0):

[001010−100][020]=[020]⎣⎡​00−1​010​100​⎦⎤​⎣⎡​020​⎦⎤​=⎣⎡​020​⎦⎤​

After applying the composite transformation matrix, the vertices of the reflected prism are:

A'(0,0,0)

B'(0,1,-1)

C'(2,2,-1)

D'(0,2,0)

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