Subject: Re: Meaning of outer product
Posted by MKatz843 on Sat, 13 Jul 2002 21:30:20 GMT
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> IDL documentation says: "Note - If A and B arguments are vectors, then C =
> MATRIX_MULTIPLY(A, B) is a matrix with C_ij = A_iB_j. Mathematically, this
> is equivalent to the outer product. . . ." But I'm having difficulty
> reconciling this with my understanding of outer product. . .
>
>   c.x = a.y*b.z - a.z*b.y
>   c.y = a.z*b.x - a.x*b.z
>   c.z = a.x*b.y - a.y*b.x
>

That's the "cross-product" c = a x b you've written (above).
As you know, the "inner product" of two 3-element vectors is a scalar,
also known as the "dot-product"

c = a . b = a.x*b.x + a.y*b.y + a.z+b.z
The inner product is written as a row vector times a column vector.

The "outer product" of two three-element vectors is a 3x3 matrix
C =
(a.x*b.x a.x*b.y a.x*b.z)
(a.y*b.x a.y*b.y a.y*b.z)
(a.z*b.x a.z*b.y a.z*b.z) (I hope this isn't the transpose!)

it's usually written as a column vector times a row vector.

Remember that vector and matrix multiplications aren't necessarily
commutitive: a times b != b times a, necessarily.

M. Katz