|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | a1 |  |  |  |
|  |  |  |  | a2 |  |  |  |
|  |  |  |  | a3 |  |  |  |
|  |  |  |  | a4 |  |  |  |
| b1 | b2 | b3 | b4 | b5 icol, icol | b6 | b7 | b8 |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

outproduct

spread(a,dim=2,ncopies=size(b))

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a(1,1)=a1 | a(1,2)=a1 | a(1,3)=a1 | a(1,4)=a1 | a(1,5)=a1 | a(1,6)=a1 | a(1,7)=a1 | a(1,8)=a1 |
| a(2,1)=a2 | a(2,2)=a2 | a(2,3)=a2 | a(2,4)=a2 | a(2,5)=a2 | a(2,6)=a2 | a(2,7)=a2 | a(2,8)=a2 |
| a(3,1)=a3 | a(3,2)=a3 | a(3,3)=a3 | a(3,4)=a3 | a(3,5)=a3 | a(3,6)=a3 | a(3,7)=a3 | a(3,8)=a3 |
| a(4,1)=a4 | a(4,2)=a4 | a(4,3)=a4 | a(4,4)=a4 | a(4,5)=a4 | a(4,6)=a4 | a(4,7)=a4 | a(4,8)=a4 |

spread(b,dim=1,ncopies=size(a))

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| b(1,1)=b1 | b(1,2)=b2 | b(1,3)=b3 | b(1,4)=b4 | b(1,5)=b5 | b(1,6)=b6 | b(1,7)=b7 | b(1,8)=b8 |
| b(2,1)=b1 | b(2,2)=b2 | b(2,3)=b3 | b(2,4)=b4 | b(2,5)=b5 | b(2,6)=b6 | b(2,7)=b7 | b(2,8)=b8 |
| b(3,1)=b1 | b(3,2)=b2 | b(3,3)=b3 | b(3,4)=b4 | b(3,5)=b5 | b(3,6)=b6 | b(3,7)=b7 | b(3,8)=b8 |
| b(4,1)=b1 | b(4,2)=b2 | b(4,3)=b3 | b(4,4)=b4 | b(4,5)=b5 | b(4,6)=b6 | b(4,7)=b7 | b(4,8)=b8 |

REBL(SP), DIMENSION(size(b),size(b)) :: outerprod\_r

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a1 b1 | a1 b2 | a1 b3 | a1 b4 | a1 b5 | a1 b6 | a1 b7 | a1 b8 |
| a2 b1 | a2 b2 |  |  |  |  |  |  |
| a3 b1 | a3 b2 |  |  |  |  |  |  |
| a4 b1 | a4 b2 |  |  |  |  |  |  |