Symbol	Stands For	Specified By Keywords
beta	Scalar value beta	beta and, for complex input, betai
smOut	Output sparse matrix	N/A (2)

(1) For the matrix format conversion operations TOCOO, TOCSC, TOCSR, and TODENSE, you can also use the cooA and cscA keywords to specify the input sparse matrix in COO or CSC format. For all other operations you must use csrA and csrG to specify the input matrices in CSR format.

(2) The output sparse matrix, smOut, is represented in CSR format by waves W_CSRValues, W_CSRColumns, and W_CSRPointerB.

MatrixSparse ADD

ADD computes the sum of sparse matrices A and G which must be in CSR format. Symbolically:

```
smOut = smA + smG
```

Inputs: Sparse matrix A and sparse matrix G, both in CSR format.

Output: A sparse matrix in CSR format represented by W_CSRValues, W_CSRColumns, and W_CSRPointerB.

MatrixSparse ADD Example

```
Function DemoMatrixSparseADD()
   // Create smA in CSR format
   Make/FREE/D/N=(11) valuesA = {1,25,26,44,16,22,28,5,11,36,42}
   Make/FREE/L/N=(11) columnsA = {0,4,4,7,2,3,4,0,1,5,6}
   Make/FREE/L/N=(6) ptrBA = {0,2,4,4,7,9}

   // Create smG in CSR format
   Make/FREE/D/N=(3) valuesG ={1,2,3}
   Make/FREE/L/N=(3) columnsG ={0,1,2}
   Make/FREE/L/N=(4) ptrBG = {0,1,2,3,3,3,3,3,3}

   // Compute smA + smG
   MatrixSparse rowsA=6, colsA=8, csrA={valuesA,columnsA,ptrBA}, rowsG=6,
            colsG=8, csrG={valuesG,columnsG,ptrBG}, operation=ADD
   WAVE W_CSRValues, W_CSRColumns, W_CSRPointerB   // Outputs from ADD

   // Print the 1D waves representing the output CSR sparse matrix
   Print W_CSRValues
   Print W_CSRColumns
   Print W_CSRPointerB
End
```

MatrixSparse MM

MM computes the product of a sparse matrix and a dense matrix. Symbolically:

```
M_MMOut = alpha*smA*dmB + beta*dmC
```

Inputs: alpha, sparse matrix A in CSR format, dense matrix B, and optionally beta and dense matrix C.

If you leave beta with its default value of 0 by omitting the beta keyword, the beta*dmC term is not computed and you do not need to specify the dmC input.

Output: Dense matrix M_MMOut.