```
   Make/FREE/D vector = {1, 1, 1, 1}    // Double-precision floating point

   // Multiply the sparse matrix by the vector
   MatrixSparse rowsA=4, colsA=4, csrA={values,columns,ptrB}, vectorX=vector,
            operation=MV

   // Create wave references for output sparse matrix
   WAVE W_MV        // Output from MV

   Print            // Prints W_MV[0]= {0,13,3,6}
End
```

The three Make commands at the start define a sparse matrix in CSR format using free waves. The values wave must be single-precision or double-precision floating point, real or complex, without INFs or NaNs. The waves containing indices, columns and ptrB in this case, must be 64-bit signed integer.

The next Make statement creates a vector which must have the same data type as the values wave.

The sparse input matrix is defined by the rowsA, colsA, and csrA keywords.

The input vector is specified by the vectorX keyword.

The operation keyword specifies the operation to be performed, MV in this case.

The output in this case is a wave named W_MV created in the current directory. It is a vector with the same data type as the values wave.

Different MatrixSparse operations require different inputs and create different outputs.

List of MatrixSparse Operations

Here are the operations supported by MatrixSparse.

Operation	What It Does
ADD	Adds two sparse matrices producing a sparse output matrix. See **MatrixSparse ADD** on page III-157 for details.
MM	Computes the product of a sparse matrix and a dense matrix producing a dense output matrix. See **MatrixSparse MM** on page III-157 for details.
MV	Computes the product of a sparse matrix and a vector producing a sparse output matrix. See **MatrixSparse MV** on page III-158 for details.
SMSM	Computes the product of two sparse matrices producing a sparse output matrix. See **MatrixSparse SMSM** on page III-158 for details.
TOCOO	Produces a sparse output matrix in COO format equivalent to the input matrix which may be in dense, CSC, or CSR format. See **MatrixSparse TOCOO** on page III-159 for details.
TOCSC	Produces a sparse output matrix in CSC format equivalent to the input matrix which may be in dense, COO, or CSR format. See **MatrixSparse TOCSC** on page III-159 for details.
TOCSR	Produces a sparse output matrix in CSR format equivalent to the input matrix which may be in dense, COO, or CSC format. See **MatrixSparse TOCSR** on page III-160 for details.
TODENSE	Produces a dense output matrix equivalent to the sparse input matrix which may be in COO, CSC, or CSR format. See **MatrixSparse TODENSE** on page III-160 for details.
TRSV	Solves a system of linear equations for a triangular sparse input matrix. See **MatrixSparse TRSV** on page III-161 for details.