```fortran
1      subroutine hecmw_matvec_33 (hecMESH, hecMAT, X, Y, COMMtime)
2
3        type (hecmwST_local_mesh), intent(in) :: hecMESH
4        type (hecmwST_matrix), intent(in), target :: hecMAT
5        real(kind=kreal), intent(in) :: X(:)
6        real(kind=kreal), intent(out) :: Y(:)
7        real(kind=kreal), intent(inout), optional :: COMMtime
8
9        integer(kind=kint) :: N, NP
10       integer(kind=kint), pointer :: indexL(:), itemL(:), indexU(:), itemU(:)
11       real(kind=kreal), pointer :: AL(:), AU(:), D(:)
12
13       N = hecMAT%N
14       NP = hecMAT%NP
15       indexL => hecMAT%indexL
16       indexU => hecMAT%indexU
17       itemL => hecMAT%itemL
18       itemU => hecMAT%itemU
19       AL => hecMAT%AL
20       AU => hecMAT%AU
21       D => hecMAT%D
22
23       call hecmw_update_3_R (hecMESH, X, NP)
24
25         do i = startPos(blockIndex), endPos(blockIndex)
26           X1= X(3*i-2)
27           X2= X(3*i-1)
28           X3= X(3*i  )
29           YV1= D(9*i-8)*X1 + D(9*i-7)*X2 + D(9*i-6)*X3
30           YV2= D(9*i-5)*X1 + D(9*i-4)*X2 + D(9*i-3)*X3
31           YV3= D(9*i-2)*X1 + D(9*i-1)*X2 + D(9*i  )*X3
32
33           jS= indexL(i-1) + 1
34           jE= indexL(i  )
35           do j= jS, jE
36              in  = itemL(j)
```

```fortran
         X1= X(3*in-2)
         X2= X(3*in-1)
         X3= X(3*in  )
         YV1= YV1 + AL(9*j-8)*X1 + AL(9*j-7)*X2 + AL(9*j-6)*X3
         YV2= YV2 + AL(9*j-5)*X1 + AL(9*j-4)*X2 + AL(9*j-3)*X3
         YV3= YV3 + AL(9*j-2)*X1 + AL(9*j-1)*X2 + AL(9*j  )*X3
        enddo
        jS= indexU(i-1) + 1
        jE= indexU(i  )
        do j= jS, jE
          in  = itemU(j)
          ! if (async_matvec_flg .and. in > N) cycle
          X1= X(3*in-2)
          X2= X(3*in-1)
          X3= X(3*in  )
          YV1= YV1 + AU(9*j-8)*X1 + AU(9*j-7)*X2 + AU(9*j-6)*X3
          YV2= YV2 + AU(9*j-5)*X1 + AU(9*j-4)*X2 + AU(9*j-3)*X3
          YV3= YV3 + AU(9*j-2)*X1 + AU(9*j-1)*X2 + AU(9*j  )*X3
        enddo
        Y(3*i-2)= YV1
        Y(3*i-1)= YV2
        Y(3*i  )= YV3
      enddo
    enddo

  end subroutine hecmw_matvec_33_inner

```