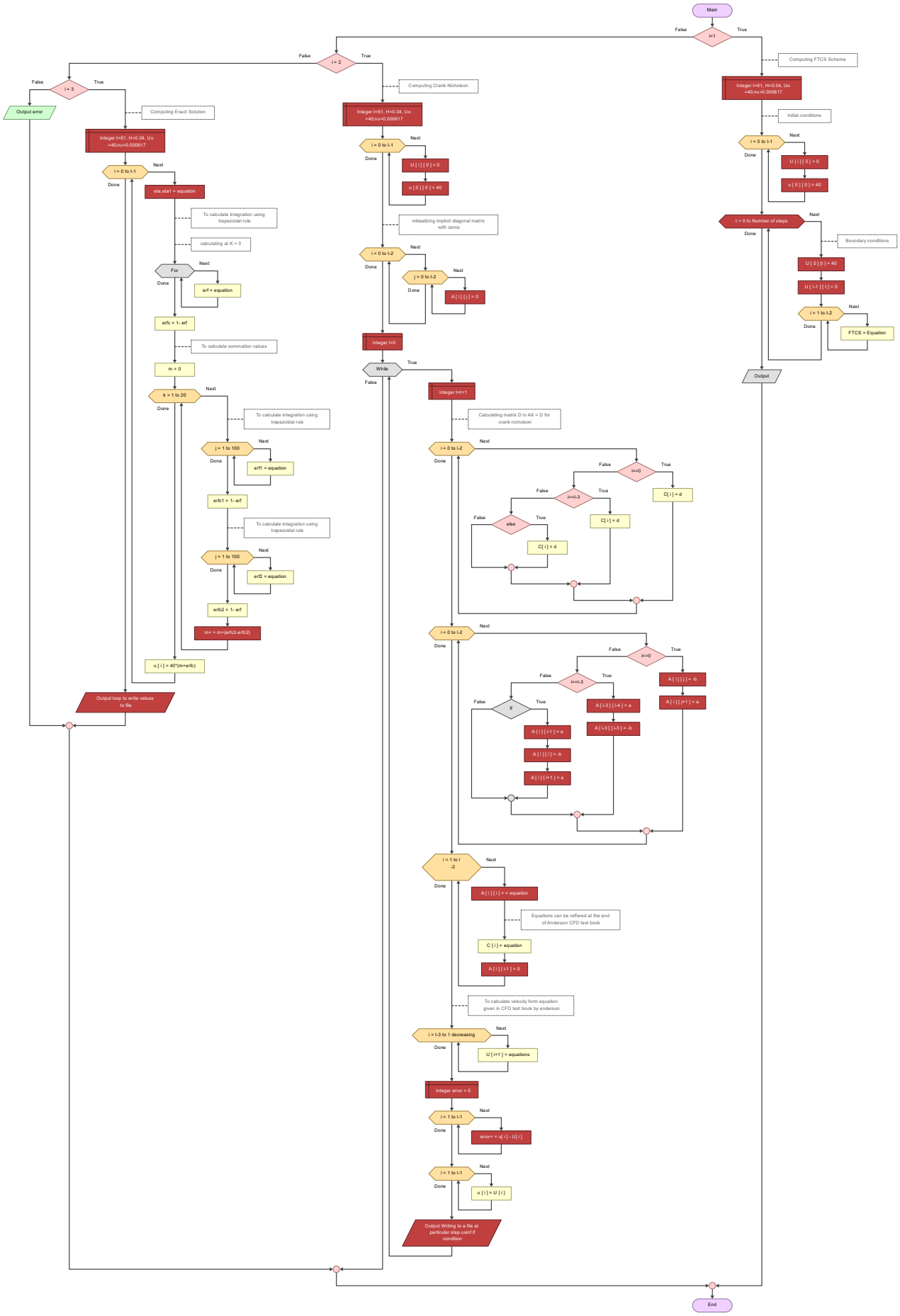
Main
i=1
False
True
Computing FTCS Scheme
Integer I=61, H=0.04, Uo =40,nu=0.000617
Initial conditions
i = 0 to I-1
Done
Next
U [i] [0] = 0
u [0] [0] = 40
t = 0 to Number of steps
Boundary conditions
U [0] [t] = 40
U [I-1] [t] = 0
i = 1 to I-2
FTCS = Equation
Output
i = 2
Computing Crank Nicholson
Integer I=61, H=0.04, Uo =40,nu=0.000617
initializing implicit diagonal matrix with zeros
j = 0 to I-2
A [i] [j] = 0
Integer t=0
While
Integer t=t+1
Calculating matrix D in AX = D for crank nicholson
j=0
j=i-3
else
C[i] = d
i = 0 to I-2
A [i] [j] = -b
A [i] [j+1] = a
A [i-3] [i-4] = a
A [i-3] [i-3] = -b
if
A [i] [i-1] = a
A [i] [i] = -b
A [i] [i+1] = a
i = 1 to I -2
A [i] [i] = = equation
Equations can be reffered at the end of Anderson CFD text book
C [i] = equation
A [i] [i+1] = 0
To calculate velocity form equation given in CFD text book by anderson
i = I-3 to 1 decreasing
U [i+1] = equations
Integer error = 0
error+ = (u[i] -U[i]
u [i] = U [i]
Output Writing to a file at particular step usinf if condition
i = 3
Output error
Computing Exact Solution
Integer I=61, H=0.04, Uo =40,nu=0.000617
eta,eta1 = equation
To calculate integration using trapezoidal rule
calculating at K = 0
For
erf = equation
erfc = 1- erf
To calculate summation values
m = 0
k = 1 to 20
To calculate integration using trapezoidal rule
j = 1 to 100
erf1 = equation
erfc1 = 1- erf
To calculate integration using trapezoidal rule
j = 1 to 100
erf2 = equation
erfc2 = 1- erf
m= = m+(erfc2-erfc2)
u [i] = 40*(m+erfc)
Output loop to write values to file
End