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PROGRAM effec
*****
* Effective medium theory for medium 2 bubbles in medium 1.      *
* From standard input it reads:                                  *
* fraction of medium 2, g-factor                                *
* input filename                                               *
* The input file should be in x y z u v                        *
* format, containing frequency,                                *
* real and imaginary part of epsilon1, and                    *
* real and imaginary part of epsilon2,                        *
* The resulting x y z file is flushed to standard output.     *
*****
parameter(nphys=100000)
real xx(nphys),y,z,u,v
complex eps1(nphys),eps2(nphys),clad1,clad2,clad3,clad4,clad5
CHARACTER*40 flin
INTEGER I,J,n,mm,ilast

read(*,'(a40)') flin
read(*,*) f,g
open(23,FILE=flin)
mm=10000
do 10 i=1,mm
  READ(23,*,END=11) xx(i),y,z,u,v
  eps1(i)=cplx(y,z)
  eps2(i)=cplx(u,v)
10 continue
11 mm=i-1
close(23)

do 31 i=1,mm
  clad1=eps1(i)-eps2(i)/g+f*(1+1/g)*(eps2(i)-eps1(i))
  clad2=csqrt(clad1**2+4*eps1(i)*eps2(i)/g)
  clad3=(clad1+clad2)/2
  clad4=(clad1-clad2)/2
  clad5=clad3
  if ((aimag(clad4).ge.0).and.(aimag(clad3).lt.0)) then
    clad5=clad4
  endif
  write(*,*) xx(i),real(clad5),aimag(clad5)
31 continue
end

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