```
pro martian_farIR_transmittance

  ;Martian atmosphere composition
  Carbon_dioxide_amount=0.95
  Nitrogen_amount=0.028
  Argon_amount=0.02
  Oxygen_amount=0.00174
  Carbon_monoxide_amount=0.00747

  Carbon_dioxide_molar_mass=44.009 ;g·mol-1
  Nitrogen_molar_mass=28.014 ;g/mol
  Argon_molar_mass=39.9 ; g/mol
  Oxygen_molar_mass=31.999 ; g/mol
  Carbon_monoxide_molar_mass=28.010 ;g/mol
  Water_Molar_mass=18.01528d ; g/mol

  Mole = 6.02214076d * 1e23 ;  Avogadro number

  ; average molar mass of Martian atmosphere
  average_molar_mass = Carbon_dioxide_amount*Carbon_dioxide_molar_mass
  average_molar_mass+= Nitrogen_amount*Nitrogen_molar_mass
  average_molar_mass+= Argon_amount*Argon_molar_mass
  average_molar_mass+= Oxygen_amount*Oxygen_molar_mass
  average_molar_mass+= Carbon_monoxide_amount*Carbon_monoxide_molar_mass

  h=0.d       ; starting hight of the simulation (km)
  h_step=0.1  ; step in the simulation (km)
  h_max=80.0  ; max altitude (km), place where simulatin stops

  xrange=[250,500]  ; spectral range in wavenumbers (cm-1)
  wn_step=0.1       ; spectral resolution (cm-1)
  n_pionts=round((xrange[1]-xrange[0])/wn_step)
  h2o_ac=dblarr(3,n_pionts)
  h2o_ac[0,*]=reverse(10000.0/(indgen(n_pionts)*wn_step+xrange[0]))  ;
array of wavenumber values (cm-1)

  co2_ac=dblarr(3,n_pionts)
  co2_ac[0,*]=h2o_ac[0,*]

  h2o_total=0.d
  co2_total=0.d
  transmittance_h2o=1.d
  transmittance_co2=1.d

  while h le h_max do begin

    h2o_ac[2,*]=Mars_h2o_absorption_coefficient(reform(h2o_ac[0,*]),h)  ;
H2O absorption coefficient at given height (h), function takes in to
account pressure and temperature of the Martian atmosphere and returns
absorption coefficients where taken from HITRAN database (Rothman et al.
2013)
    co2_ac[2,*]=Mars_co2_absorption_coefficient(reform(h2o_ac[0,*]),h)  ;
the same for CO2

    n_of_moles=martian_atmospheric_density(h)*1000.d / average_molar_mass *
h_step * 1000.d / 10000.d ; n of moles of martian atmosphere malecules in
the qube 1cm*1cm*h_step
    n_of_h2o_moles=martian_h2o_distrib(h)*n_of_moles/1e6 ; n of H2O  moles
in the qube 1cm*1cm*h_step
    n_of_co2_moles=n_of_moles*Carbon_dioxide_amount  ; n of CO2  moles in
the qube 1cm*1cm*h_step
```

```
    n_of_h2o_molecules=n_of_h2o_moles*Mole ; n of H2O molecules in the qube
1cm*1cm*h_step
    n_of_co2_molecules=n_of_co2_moles*Mole ; n of CO2 molecules in the qube
1cm*1cm*h_step
    h2o_total+=n_of_h2o_moles
    co2_total+=n_of_co2_moles
    absorption_h2o=((reform(h2o_ac[2,*])*n_of_h2o_molecules)) ; absorption
caused by a given number of H2O molecules
    absorption_co2=((reform(co2_ac[2,*])*n_of_co2_molecules)) ; absorption
caused by a given number of CO2 molecules
    curr_transmittance_h2o=exp(-absorption_h2o) ; transmittance through
current layer
    curr_transmittance_co2=exp(-absorption_co2) ; transmittance through
current layer
    transmittance_h2o=transmittance_h2o-transmittance_h2o*(1-
curr_transmittance_h2o) ; total transmittance at given height h
    transmittance_co2=transmittance_co2-transmittance_co2*(1-
curr_transmittance_co2) ; total transmittance at given height h
    print,h
    h+=h_step
  endwhile

;arrays transmittance_h2o and transmittance_co2 contain total Martian
atmospheric transmittance

end
```