Triogen Turbine Optimization

Properties SU2 and Coolprop

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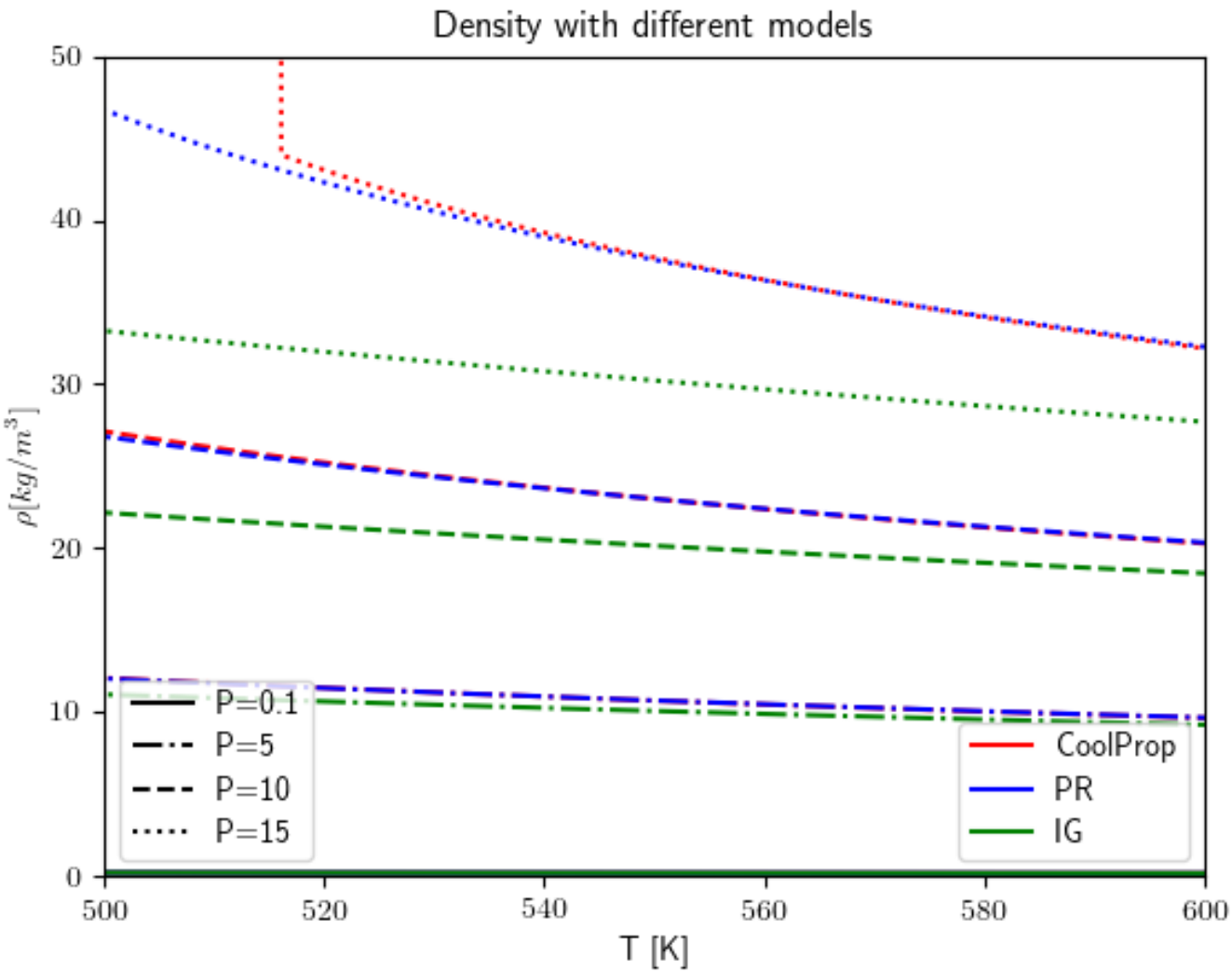
June 18, 2018

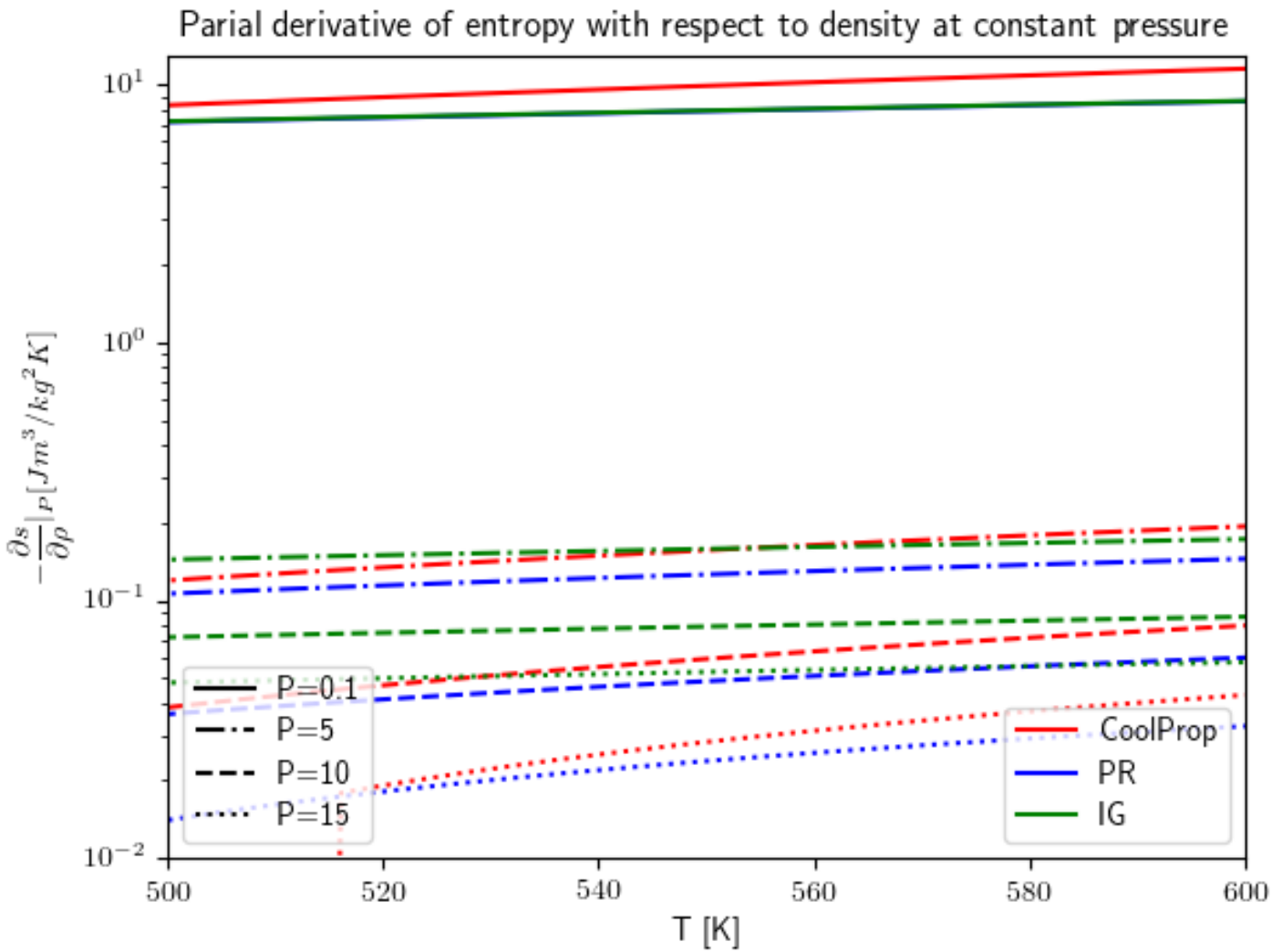
Variable properties in SU2

- Incorporated the visosity model and thermal conductivity model of CoolProp in SU2
  - Reference Correlation of the Viscosity of Toluene from the Triple Point to 675 K and up to 500 MPa (Avgari and Assael, 2015)
  - Reference Correlation of the Thermal Conductivity of Toluene from the Triple Point to 1000 K and up to 1000 MPa (Assael et al., 2012)
- Peng-Robinson Equation of state used for the thermodynamic properties
- In thermal conductivity model critical correction term not included
- Next figures will show the difference between de CoolProp EOS and the other EOS in SU2

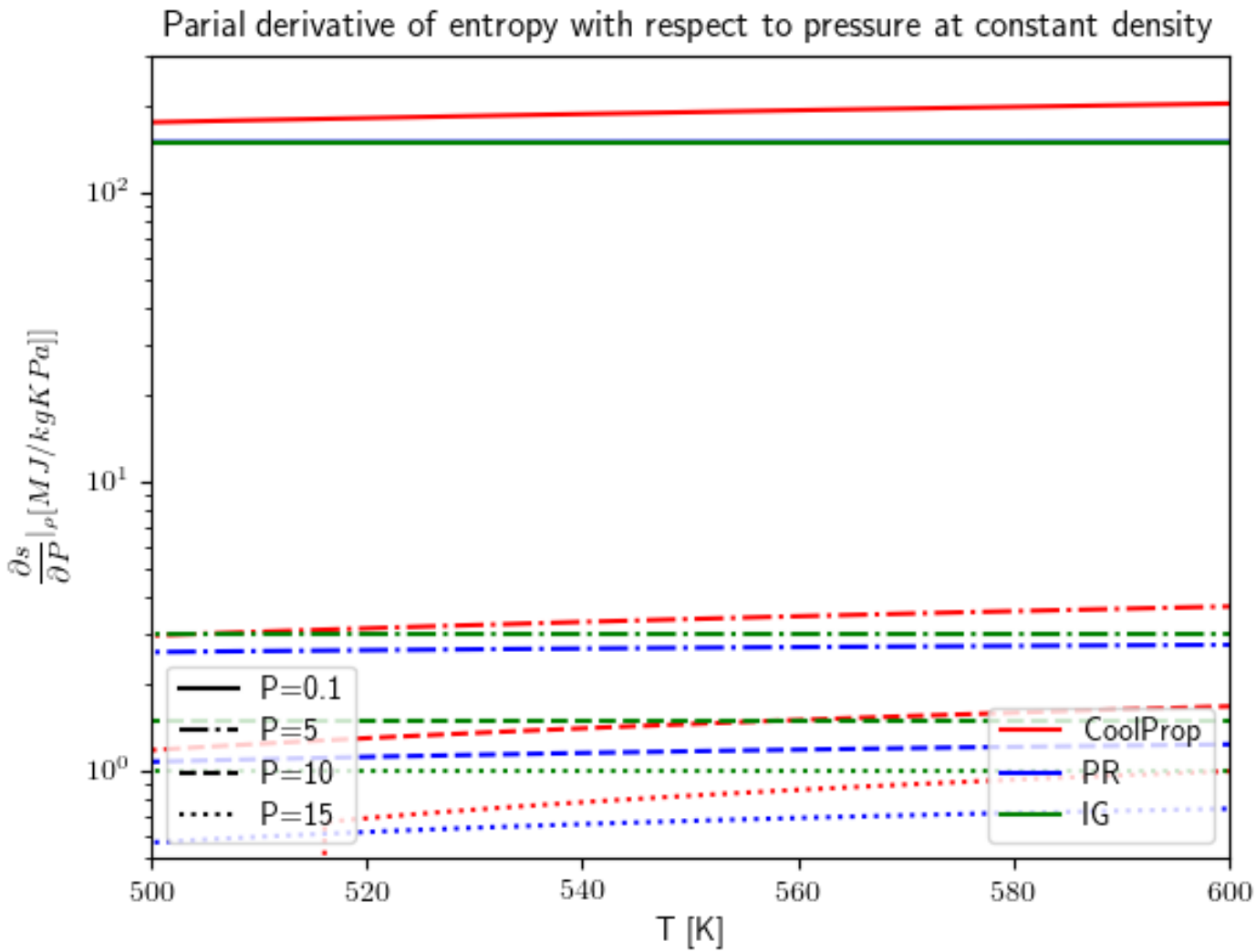
Density


Density with different models
50
40
30
20
10
0
$\rho[kg/m^3]$
500
520
540
560
580
600
T [K]
P=0.1
P=5
P=10
P=15
CoolProp
PR
IG

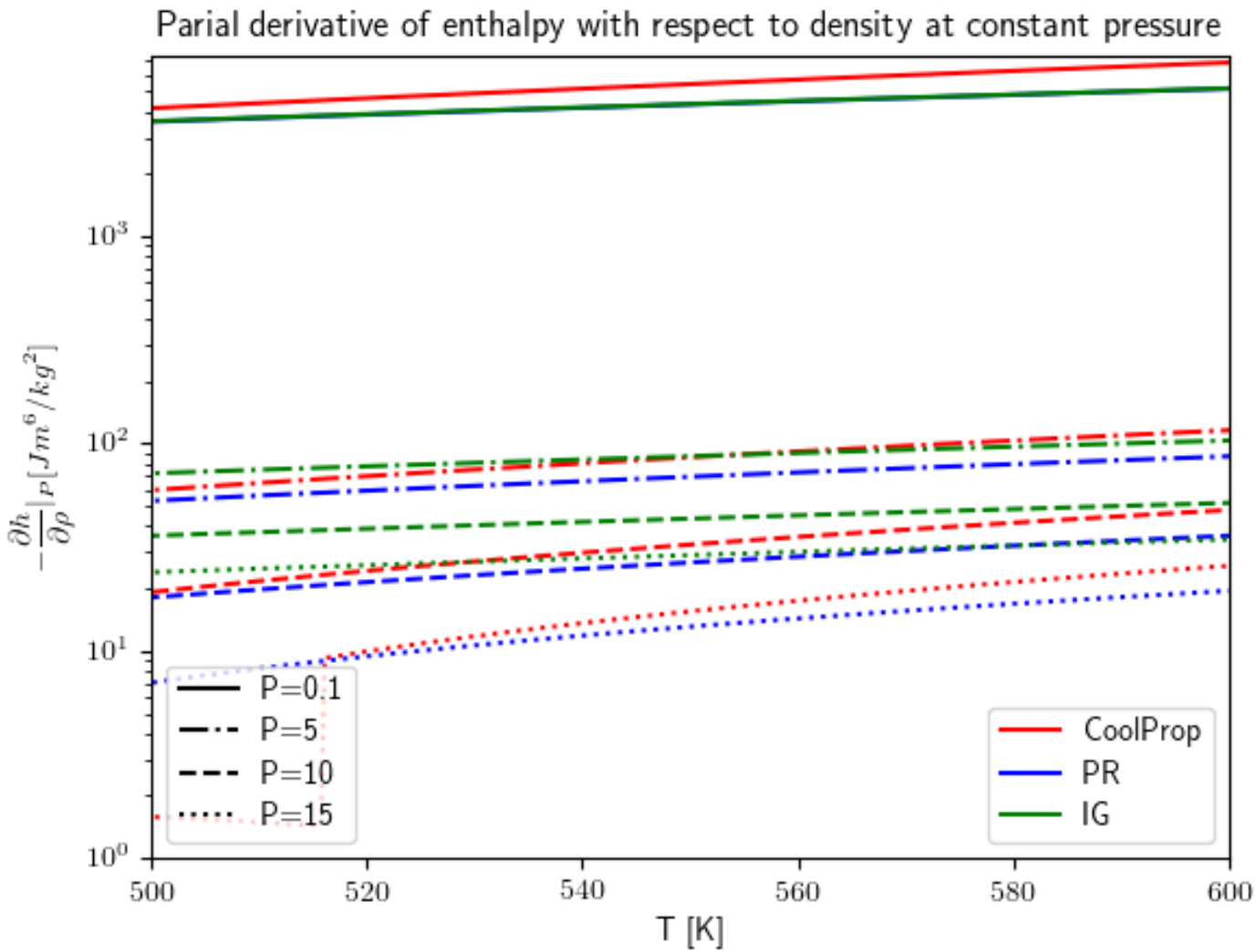
Entropy at constant pressure



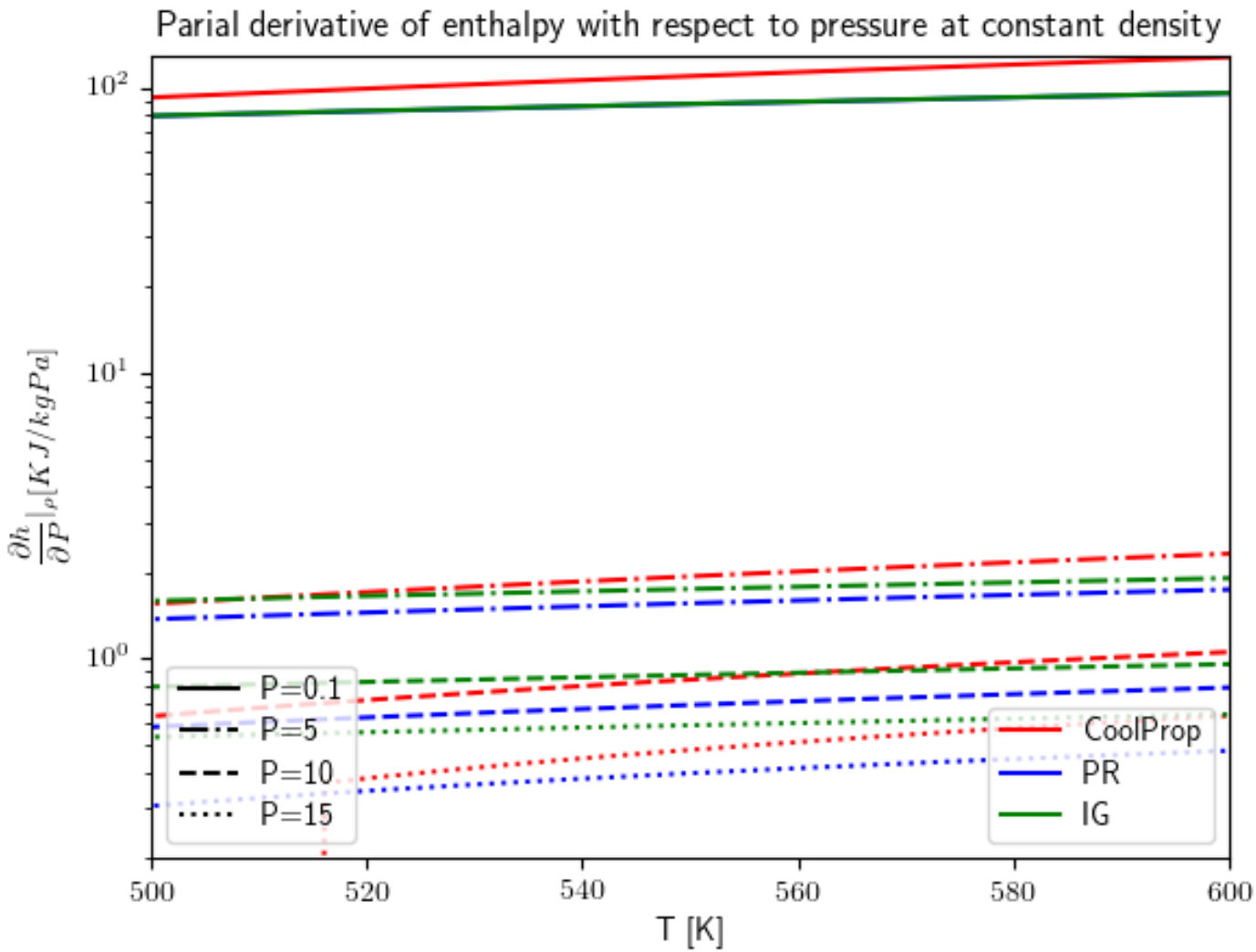
Entropy at constant density



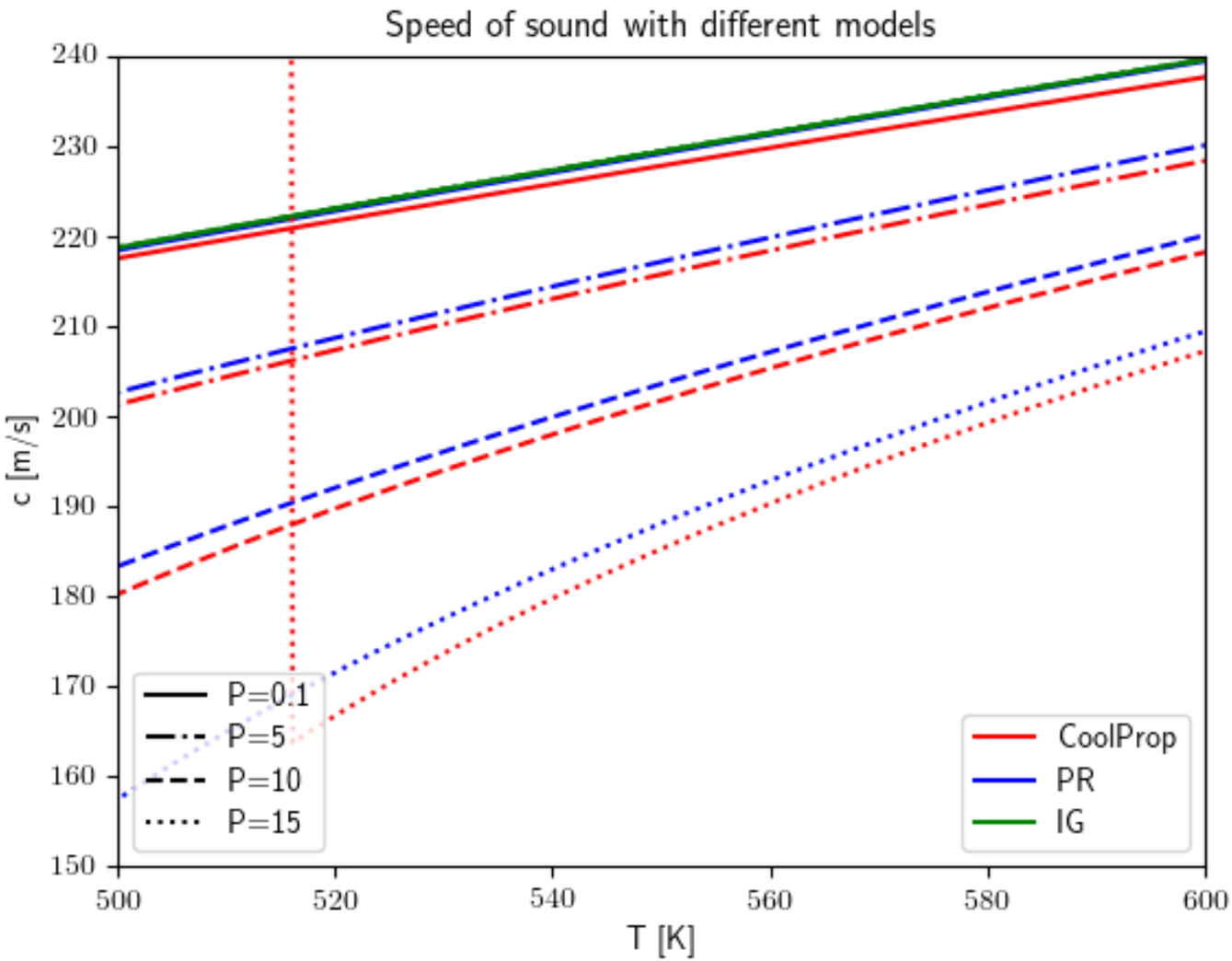
Enthalpy at constant pressure



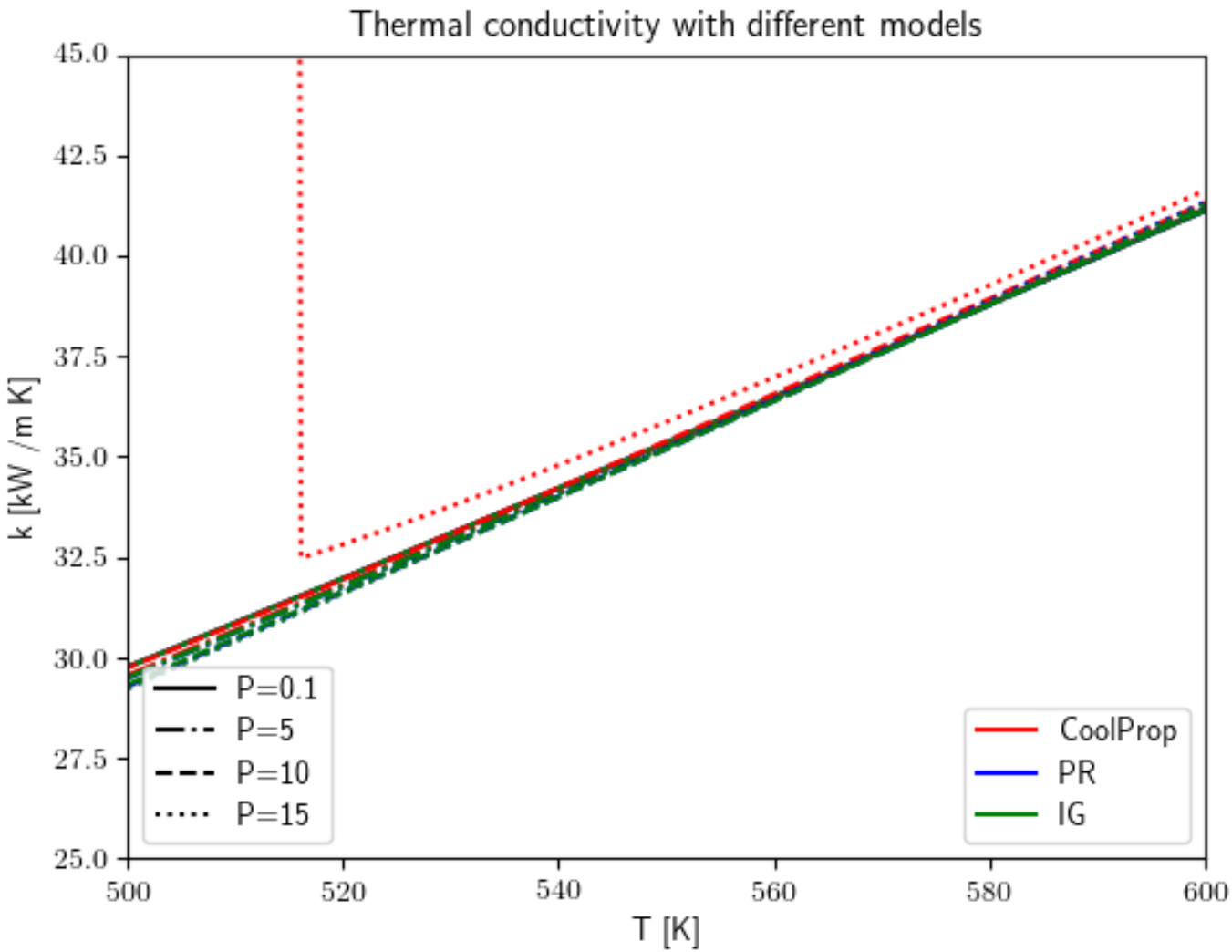
Enthalpy at constant density



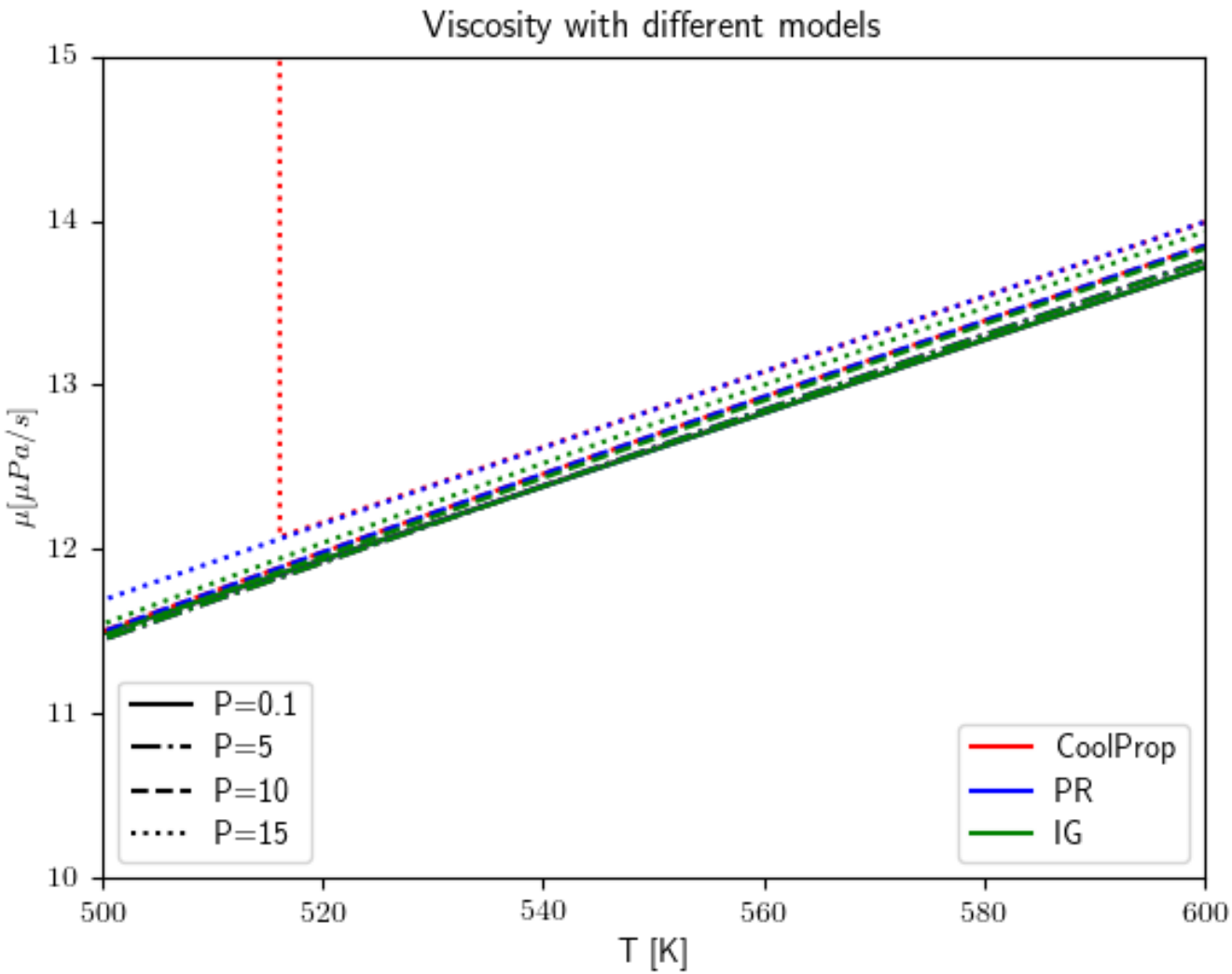
Speed of sound



Thermal conductivity



Viscosity


Viscosity with different models
15
14
13
12
11
10
$\mu[\mu Pa/s]$
500
520
540
560
580
600
T [K]
P=0.1
P=5
P=10
P=15
CoolProp
PR
IG