FluidProp 3.2
What's new

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FluidProp 3.2

FluidProp 3.2, build 352, for Windows, Linux, and macOS, includes the following new features and improvements compared to FluidProp 3.1:

1. The RefProp Add-on for FluidProp is now based on the RefProp 10.0 code and fluids. The RefProp 9.1 Add-on is no longer available.

2. The Hydrofluoroolefins Add-On for FluidProp has been updated and contains improved models of the existing fluids and 5 new fluids, namely:

   - - HCFO-1224yd-Z
   - - HCFO-1233zd-Z
   - - HCFO-1233xf
   - - HFO-1234ze-Z
   - - HFO-1336mzz-E

FluidProp 3.1

FluidProp 3.1, build 350, includes the following new features and improvements compared to FluidProp 3.0.4:

1. FluidProp for macOS and Linux: FluidProp is now available for macOS and Linux. The free versions for macOS and Linux contain a limited fluid set. The basic versions of macOS and Linux have the same functionality as the MS-Windows version with respect to the thermodynamic libraries, the thermodynamic properties that can be calculated, and the fluids that are available.

2. The maximum number of fluids that is allowed in FluidProp has been extended from 250 to 1000. This means that if FluidProp is called from your own programming code (Fortran, C++, or whatever programming language), you have to allocate at least 1000 elements for the arrays storing the names of the available fluids, e.g. that return from the GetFluidNames function.

3. Python: although the MS Windows version of FluidProp could already be used in Python programs, an additional dedicated Python interface was added to FluidProp 3.1 such that working with FluidProp in Python is as easy as with other client programs. As far as FluidProp is concerned, Python code with FluidProp calls is platform-independent.

4. The Basic version has been extended with input data for 17 new fluids and two new fluid packages are available as Add-On. Furthermore, all fluids available for (free)StanMix are now also all available for PCP-SAFT.

   - The Basic version has been extended with input data for the following fluids:

     1. 1-butene
     2. 2-propanol
     3. 1,1-dimethylcyclohexane
     4. 1,1-dimethylcyclopentane
     5. carbon monoxide
     6. ethene (ethylene)
     7. ethyne (acetylene)
     8. HFE-245mc
     9. hydrogen sulfide
     10. methylcyclohexane
     11. methylcyclopentane
     12. neon
     13. perfluoropropane (R218)
     14. R11
     15. R13
     16. R114
     17. R115

- The Liquid Metals Add-On for the TPSI library has been extended with models of mercury and lithium.
- Extended Fluid Set (new!): the Extended Fluid Set Add-On contains data for 44 additional fluids:

1. 1-butanol
2. 1-butyne
3. 1-octanol
4. 1-pentene
5. 1-propanol
6. 1,3-butadiene
7. 2-butanol
8. biphenyl
9. butanone
10. butylbenzene
11. carbonyl sulfide
12. chlorobenzene
13. cyclobutane
14. cycloheptane
15. cyclooctane
16. cyclopentane
17. cyclopropane
18. decane
19. diethylether
20. dimethylcarbonate
21. diphenylether
22. dodecane
23. ethylene glycol
24. hexadecane
25. HFE-347mcc
26. isooctane
27. krypton
28. m-xylene
29. neopentane
30. nonane
31. Novec 649
32. o-xylene
33. p-xylene
34. propene (propylene)
35. propyne
36. R123
37. R124
38. R143a
39. R150 (1,2-dichloroethane)
40. R152a
41. sulfur dioxide
42. titanium tetrachloride
43. undecane
44. xenon

- Perfluorocarbons (new!): the Perfluorocarbons Add-On contains data for 18 perfluorocarbons:

1. perfluorobutane
2. perfluoropentane
3. perfluorohexane
4. perfluoroheptane
5. perfluorooctane
6. perfluorononane

7. perfluorocyclobutane (RC318)
8. perfluorocyclohexane (PFCH)
9. perfluoro-2-methylpentane (PP1)
10. perfluorocyclomethylhexane (PP2)
11. perfluorocyclodimethylhexane (PP3)
12. perfluorodecalin (PP6)
13. perfluoromethyldecalin (PP9)
14. perfluoroperhydrofluorene (PP10)
15. perfluorotoluene
16. perfluorobenzene (CP28)
17. PP80 (perfluoro-2-methyl-3-ethylpentane)
18. PP90 (perfluoro-2,4-dimethyl-3-ethylpentane)

    The fluid set of the Basic version already contains data for perfluoromethane (R14), perfluoroethane (R116), and perfluoropropane (R218, new!).

5. FluidProp 3.1 for MS-Windows can be used with NIST REFPROP 10. During execution FluidProp detects automatically if REFPROP has been installed on your computer. Like REFPROP 9.x, REFPROP 10 integrates seamlessly with the other FluidProp libraries. However, now, the table of available fluids in FluidProp contains the fluids of REFPROP 10 instead of those of 9.x. As a consequence, the FluidProp method GetFluidNames lists all fluids available in REFPROP 10, and, in case REFPROP 9.x is still used and one of the REFPROP 10 fluids is employed that is not available in 9.x, then an error message is sent by REFPROP.

   For macOS and Linux platforms only our own build-in RefProp 9.1 Add-On is available, which is also still available for MS-Windows. Additional to the NIST REFPROP distribution, our RefProp 9.1 Add-On features the computation of the fundamental derivative of gas dynamics. It is expected that the RefProp Add-On is upgraded to RefProp 10 soon.

FluidProp 3

Compared to FluidProp 3.0.1, 3.0.2, and 3.0.3, release 3.0.4 includes the following new features and improvements:

- FluidProp can be expanded with the Hydrofluoroolefins add-on, which includes the new, recently developed, low GWP fluids HCFO-1233zd-E, HFO-1234yf, HFO-1234ze-E, HFO-1243zf, and HFO-1336mzz-Z. These fluids are candidate replacement fluids for foam blowing agents, refrigerations applications, air conditioning systems, and working fluids in heat pumps and low temperature organic Rankine cycle systems. They can be used in combination with the (free)StanMix and PCP-SAFT sub-libraries.

- The Siloxanes add-on has been extended with the cyclic siloxanes D3, D4, D5, and D6, which can be used in combination with the (free)StanMix and PCP-SAFT sub-libraries.

- The temperature range of carbon dioxide in (free)StanMix has been extended to 1500 K.

- FluidProp can be expanded with the Transport Properties add-on, which enables the use of transport property calculations in FluidProp.

Compared to FluidProp 2.4, release 3.0.1 includes the following new features and improvements:

- FluidProp no longer uses fluid files. Instead the fluid data is stored in and retrieve from a fluid database.

- The fluid library "StanMix" and "StanMix3" have been renamed to "freeStanMix" and "StanMix" respectively, breaking backwards compatiblity.

- FluidProp can be expanded with the following more advanced fluid models:

  - RefProp 9.1. Users can also use their own RefProp (either 9.0 or 9.1) from NIST with FluidProp now.
  - PCP-SAFT (Perturbed-Chain Polar Statistical Association Fluid Theory), an equation of state that is based on statistical mechanics. More detailed information can be found in the help file.

  - StanMix, which implements the iPRSV equation of state. The iPRSV equation of state is an improvement of the Peng-Robinson, Stryjek-Vera modified (PRSV) equation of state. Additional information can be found in the help documentation.

- At present there is not a Linux version of 3.0.1.
- FluidProp is compatible with both 64 as well as 32-bit systems and is compatible with 64-bit versions of Matlab and Excel.
- FluidProp now offers the computation of partial derivatives.
- For TPSI: the liquid metals metals cesium, rubidium, potassium and sodium and the alkanes ethane, isobutane and heptane have been added to the fluid library.
- A correction to the enthalpy calculation in freeStanMix and StanMix has been made.
- For freeStanMix and StanMix: Mixtures of carbon dioxide with propane, butane, pentane, hexane, benzene and toluene have been added to these fluid libraries.
- If 'c' or 'cas' is specified in the 'GetFluidNames' method then the 'GetFluidNames' method will return a list of CAS numbers of the fluids returned.
- A severe memory leak in the C/C++ and Modelica interfaces has been repaired.
- Memory leaks have been removed from the COM interfaces between FluidProp and its sublibraries.
- Several code modifications have resulted in a significant speed-up.
- A small bug in the calculation of the fundamental derivative of gasdynamics (gamma) in the two-phase region has been removed. Results in gamma will differ slightly.
- The use of pseudo mixtures (PPF files) of RefProp has been made possible.

FluidProp 2

Compared to FluidProp 2.3, release 2.4 includes the following new features and improvements:

- Next to the usual, familiar, interface of FluidProp a new interface has been added. This new interface complies with the CAPE-OPEN Thermodynamic and Physical Properties Interfaces. The CAPE-OPEN interface allows FluidProp to be used directly in other software tools that comply with the CAPE-OPEN standard.
- Now a compiled help file is available that also works with Windows Vista and Windows 7.
- A Linux version has been released recently. You can find more information about this version on the website of FluidProp.
- A number of minor bugs have been fixed.

Compared to FluidProp 2.0, release 2.3 includes the following new features and improvements:

- New methods have been added, namely, *zeta* (∂T/∂v at const. u), *theta* (volumetric thermal expansion coefficient) and *kappa* (isothermal compressibility) - see the on-line help.
- The method *AllProps*, which calculates all thermodynamic and transport properties at once, has been extended to return also *zeta*, *theta* and *kappa* (see on-line help).
- The method *AllPropsSat* has been added. This method computes the same properties as *AllProps* and in addition a number of saturation conditions (regular properties and derivatives) at the saturated state (see on-line help).
- The full version of FluidProp now contains RefProp 8.0 (please contact us about how to get the full version).
- Now unit conversions are possible for the output of the info subroutines too.
- Client samples of Visual C++ .NET 2002 and Visual C++ 2005 and a client sample for Modelica have been added.

- A small change has been applied in the Matlab *SetFluid_M* COM-interface function, so that FluidProp is suited for the latest Matlab versions as well.
- The calculation of the isochoric specific heat C_v in the 2-phase region has been added.
- A number of minor bugs have been fixed.

Compared to FluidProp 1, release 2 includes the following new features and improvements:

- StanMix has been thoroughly debugged.
- Secondary thermodynamic properties (α, β, χ, ϕ, ξ, ψ, Γ, see the on-line help) can now be calculated also in the 2-phase region
- A unit conversion module has been added. Different units and units sets (like SI and Anglo-Saxon) and even dimensionless properties can now be entered and calculated.
- GasMix has been renewed and thoroughly debugged. It has been extended with the calculation of secondary thermodynamic properties and with a number of new possibilities to define the thermodynamic state.
- Methods have been added to return fluids parameters, like molecular mass, critical point data and property ranges.
- A new method is available now to calculate all thermodynamic and transport properties at once.
- The calculation speed has been considerably increased.
- The naming of fluids has been standardized for all fluids. To maintain backward compatibility, the library-specific fluid names can still be used.
- RefProp predefined mixtures are now available in the "Full" and the "Full ET" versions of FluidProp.
- A Readme.txt file has been added. This file describes the installation procedure for the FluidProp Excel Add-In. In the last dialog window of the installation program there is a checkbox which the user can checkmark if he wants to see this Readme file.
- Samples clients for Intel Visual Fortran and Maple have been added to the *sample clients* sub-folder.