XSteamW – a vectorizing wrapper for XSteam

Volker Staben – Flensburg University of Applied Sciences

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XSteamW – a vectorizing wrapper for XSteam

Syntax:

```
result = XSteamW (Var1, Var2);
result = XSteamW (Var1, Var2, Var3);
```

XSteam.m is a function, written by Magnus Holmgren, for calculating Steam and Water properties according to the IAPWS IF-97 standard. XSteam is free, see http://www.x-eng.com or http://www.mathworks.com/matlabcentral/fileexchange/9817. Thanx to Magnus!

Unfortunately XSteam does not support vectors as passed arguments. So calling XSteam following vectorized code guidelines sometimes results in error messages. Therefore writing some kind of loops around XSteam seems to be unavoidable in certain cases.

XSteamW.m is a „wrapper" for XSteam, doing this „looping" around XSteam. Like XSteam, XSteamW supports two or three arguments. The argument Var1 denotes the function XSteam calculates. The 2nd argument Var2 serves as an input variable to this function:

```
result = XSteam (Var1, Var2);
```

Example: calculation of saturated vapour heat capacity as a function of pressure, expressed in bar:

```
vapour_heat_capacity = XSteam ('CpV_p', pressure);
```

Functions of two variables need three arguments passed to XSteam. The first argument denotes the function XSteam calculates. The 2nd and 3rd argument serve as input variables to this function:

```
result = XSteam (Var1, Var2, Var3);
```

Example: calculation of steam enthalpy as a function of pressure and temperature, expressed in bar and °C:

```
enthalpy = XSteam ('h_pt', pressure, temperature);
```

For documentation of XSteam functions passed through Var1 see the XSteam documentation.

XSteamW.m adds support for row or column vectors passed as arguments Var2 and/or Var3. Var1 is passed unchanged to XSteam.

```
result = XSteamW (Var1, Var2);
result = XSteamW (Var1, Var2, Var3);
```

Results are calculated as an m-by-n matrix. The number m of rows equals the length of `Var2`, the number n of columns equals the length of `Var3`.

Example: all of these calls

```
XSteamW ('h_pt', [100, 150, 200], [500, 510, 520, 530])
XSteamW ('h_pt', [100; 150; 200], [500, 510, 520, 530])
XSteamW ('h_pt', [100, 150, 200], [500; 510; 520; 530])
XSteamW ('h_pt', [100; 150; 200], [500; 510; 520; 530])
XSteamW ('h_pt', 100:50:200, 500:10:530)
```

will result in

```
ans =
    1.0e+03 *
    3.3751    3.4008    3.4263    3.4517
    3.3108    3.3395    3.3678    3.3957
    3.2412    3.2736    3.3052    3.3361
```

Calling

```
XSteam ('h_pt', 100, 500)
```

will give

```
ans =
    3.3751e+03
```

Calling

```
XSteam ('h_pt', 200, 530)
```

results in

```
ans =
    3.3361e+03
```