

Remarks on the Implementation of the Modelica Standard Tables

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This article reveals some implementation details regarding the C code of the revised table interpolation blocks released with the Modelica Standard Library (MSL) 3.2.1. This new table implementation was named *Modelica Standard Tables* and comprises the following four blocks for univariate and bivariate interpolation

- Modelica.Blocks.Sources.CombiTimeTable,
- Modelica.Blocks.Tables.CombiTable1D,
- Modelica.Blocks.Tables.CombiTable1Ds and
- Modelica.Blocks.Tables.CombiTable2D.

The emphasis is placed on the unique features of the CombiTimeTable which are the discontinuities by time events and the periodic extrapolation (Fig. 1). For instance, periodic and discontinuous signals like saw-tooth or square-wave w.r.t. simulation time can be modeled in a very convenient and compact way. However, the numerically stable detection of periodic time events is rather tricky since floating-point arithmetic must not be used to detect them.

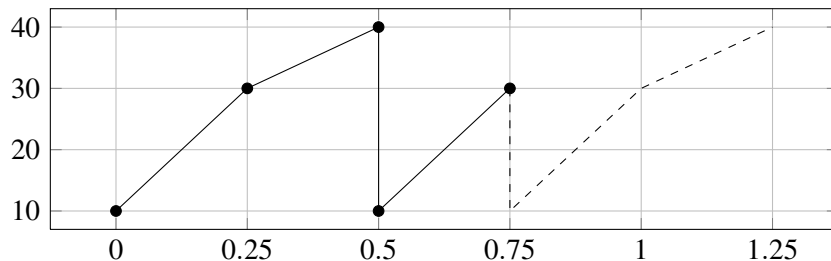


Figure 1: There are two time events per period in case of linear interpolation and periodic extrapolation of the 5×2 time table $[0, 10; 0.25, 30; 0.5, 40; 0.5, 10; 0.75, 30]$.

Besides the CombiTimeTable basic information on the univariate and bivariate interpolation by Akima splines [1, 2] and the available table array memory optimization options are summarized. Last but not least, the remaining newly implemented table interpolation features are also mentioned.

References

- [1] Hiroshi Akima. A new method of interpolation and smooth curve fitting based on local procedures. *J. ACM*, 17(4):589–602, October 1970.
- [2] Hiroshi Akima. A method of bivariate interpolation and smooth surface fitting based on local procedures. *Commun. ACM*, 17(1):18–20, January 1974.