Review of New Features in Maple 17

Summary

Many of the highlighted new features in Maple 17 appear heavily correlated with earlier features of *Mathematica*® but are often only skin-deep.

Only a small fraction of *Mathematica*'s advances make it into Maple at all. For those that do, the average time lag between features being introduced in *Mathematica* and an initial, skin-deep implementation in Maple is around eight years. Look at *Mathematica* 9 for what to expect in Maple's 2021 release!

New Features Timeline

Maple 17 Feature (2013)	**Year Added to *Mathematica***	**Notes**
One-step app creation	2007	Maple's Explore command is a skin-deep attempt to appear to support *Mathematica*'s popular Manipulate command. However, Explore only supports sliders while *Mathematica*'s much more powerful Manipulate function can automatically use checkboxes, pop-up menus, sliders with arbitrary discrete steps, 2D sliders, 2D discrete sliders, locators within displayed contents, and more. Explore has no control over the appearance, direction, size, or placement of its sliders and no control or automation over refresh quality or triggers. Explore cannot be nested, does not support bookmarks, cannot be exported to animations, and does not support hardware controllers. It cannot be extended with custom controllers or automatically embedded in generated reports. *Mathematica* supports all of this and more.
Möbius Project	2007	The Wolfram Demonstrations Project set out a clear vision for a platform for sharing interactive apps for demonstrating technical ideas. Thanks to the ease of interface creation provided by *Mathematica*'s superior Manipulate command, over 8,500 apps have been created and shared by the *Mathematica* community. While the Möbius Project is not yet public, it appears to be little more than an imitation of Demonstrations.
Maple Player	2007	Wolfram Research has provided a free Player for *Mathematica* content for over 20 years. With the advent of easy-to-author interactive content in 2007, the MathPlayer was upgraded to Wolfram *CDF Player*™, which contains a full *Mathematica* kernel to drive interactive computa-tional content in the Computable Document Format™(CDF). *CDF Player*, supports all major platforms and can be embedded in HTML under all major browsers. At the time of writing, the Maple Player is not yet available for user content.
Math apps	2007+	Specialized *Mathematica* apps appear for free in the Wolfram Demonstrations Project, not in *Mathematica*. In the last year, the Demonstrations Project has grown by around 1,000 apps compared to the 45 promoted in this Maple release. The Maple 17 New Features pages show three examples: "River Crossing" appeared in the Demonstrations Project in 2012, there are 22 Demonstrations related to "Cost of Production," and the "Tides" example can be implemented in a single line of *Mathematica* code. These are not major features.
Advanced Code Editor: Syntax Highlighting	2007	Maple syntax highlighting works only for plain-text code and only for keywords and operators. In contrast, *Mathematica* also supports syntax highlighting for expressions within or containing typeset 2D mathematical expressions, and also colors local variables and function parameters for easier code reading.

Maple 17 Feature (2013)	**Year Added to *Mathematica***	**Notes**
Advanced Code Editor: Bracket Matching	2007	Again the Maple support is skin-deep, matching brackets only if you limit yourself to plain-text coding. Bracket matching is particularly important in math expressions where highly nested brackets can be common, and putting a bracket in the wrong level of a 2D expression is a common mistake.
Advanced Code Editor: Quote Matching	2007	Maple supports this only for text, not in typeset math. *Mathematica* supports both.
Advanced Code Editor: Automatic Indentation	2007	Maple only supports this for text, not in typeset math. *Mathematica* supports both.
Advanced Code Editor: Command Completion	2012	Maple only supports this for text, not in typeset math. This missing feature is particularly significant given the inconsistent naming and capitalization of Maple's mathematical functions. Using *Mathematica*'s typeset layout for clarity of complex expressions does not have to come at the price of limiting ease of use.
Advanced Code Editor: Error Checking	2007	Maple only supports this for text, not in typeset math. *Mathematica* error checks whether options are valid for the functions they appear in, as well as checking argument count and structure.
Performance: hardware elementary functions	1999	These may have been implemented in response to being highlighted in the numerical performance benchmark created by Wolfram Research in 2011, which showed Maple to be, on average, 318–2,845 times slower for these operations and 38 times slower for other numerical computations. New benchmarks will be available soon.
Performance: parallel linear algebra	2005	The claimed improvements appear to be mainly for OS X and Linux, with only modest improvements to Eigenvalues and Eigenvectors under Windows. It is likely that the conclusions of the performance benchmarks for Maple 16 under Windows will remain largely unchanged at 38 times slower than *Mathematica*.
Performance: sparse vector concatenation	1999	These may have been implemented in response to being highlighted in the numerical performance benchmark created by Wolfram Research in 2011, which showed Maple to be, on average, 13,512 times slower for sparse matrix computations and 38 times slower for other numerical computations.
Signal processing: cosine, fast Fourier, and wavelet transforms	2010	Typically skin-deep, Maple's implementation of discrete wavelet transform supports only the Haar wavelet, only in its float[8] data type, and lacks continuous wavelet transforms. *Mathematica*'s DiscreteWaveletTransform supports 10 different discrete wavelet families using floating point, complex, or arbitrary precision numbers and ContinuousWaveletTransform with five different continuous wavelet families. Maple's discrete cosine transform (DCT) supports only Type II DCT; *Mathematica* supports Type I, II, III, and IV DCTs.
Signal processing: Bartlett, Blackman, Kaiser, Hann, and Hanning (sic) windows	2010	Again, Maple supports only a subset of *Mathematica*'s functionality. *Mathematica* supports 14 non-parametric window functions and 10 parametric windows, including the five supported by Maple.
Signal processing: signal generation	2012	Maple's support for signal generation still falls considerably short of *Mathematica*'s.
Signal processing: cross-correlation, autocorrelation, data statistics, and upsampling/downsampling	2012	There are now two different AutoCorrelation functions in Maple, one for float[8] data and one for other data. *Mathematica* handles the data type used automatically. Maple's UpSample can take only float[8] or complex[8] data. *Mathematica* can handle any kind of data.

Maple 17 Feature (2013)	Year Added to *Mathematica*	Notes
Signal processing: FIR, IIR, and Butter-worth filters	2012	Some of this functionality has been in *Mathematica* since 2003.
Search and replace in math expressions	2007	Maple's concept of search and replace in math expressions is limited to finding text in math expressions. *Mathematica* allows search and replace for whole typeset expressions, and using the *Mathematica* language search and replace can find and transform math expressions by layout, style, and general pattern matching.
Graph theory: invariant polynomials	1990s	The scope and performance of graph theory is much greater in *Mathematica*.
Graph theory: IsIsomorphic	2010	Maple's IsIsomorphic function can only handle undirected, unweighted graphs. *Mathematica*'s IsomorphicGraphQ handles all graph types.
Graph theory: LaplacianMatrix	2008	*Mathematica* is able to return sparse arrays for very high performance when handling large graphs, while Maple can only return dense matrices, limiting its application to smaller graphs.
Math: linear inequality solving	2003	
Math: semialgebraic system solving	2003	
Math: solving equa-tions with branch cuts	2003	
Visualization: auto-matic 3D axes	1988	Wolfram Research highlighted this and many other sub-optimal Maple graphics defaults and controls in a 2009 report. Clear visualizations prevent misunderstandings and support profes-sional quality for your reports and publications. Wolfram Research has always considered this important.
Visualization: plotting of inequalities	2002	Maple still only supports this in 2D. *Mathematica* supports both 2D and 3D inequality plotting.
Visualization: visualize branch cuts	2007	Maple's functionality is not equivalent to *Mathematica*'s automatic branch cut detection—it allows you to request a visualization of the branch cuts of individual functions but does not detect branch cuts in functions that you try to plot.
Visualization: Cayley tables		This is available at the Wolfram Demonstrations Project.
Control: the Frequen-cyResponse routine handles differential equations with input derivatives	2010	In 2012, *Mathematica* added support for linear descriptor systems so that even systems with input derivatives of higher order than the plant variables are fully integrated.
Control: all models now accept linear, non-differential systems	2012	
Control: frequencies option for all frequency-based plots	2010	Minor feature correcting an unnecessary limitation.

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Control: the Grammians command has been extended to work with discrete systems	2010	
Programming: use of D, I, etc. as local variables	1988	
Programming: sort with output option	2000	
Programming: selecting or removing items from a table	1988	
Essay Tools		While this package is rather specialized, *Mathematica*'s string handling and semantic word data make this kind of semantic analysis, similarity measurement, and word counting easy.

For more comparison information, see:
http://www.wolfram.com/mathematica/compare-mathematica/compare-mathematica-and-maple.html