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GDD-200 Optimised Math Library for TMS320C67x.

This is a collection of functions and macros for calculating elementary algebraic and transcendental functions.

The library consists of the following parts:

- Algebraic and utilities functions
- Trigonometric functions
- Inverse trigonometric functions
- Hyperbolic trigonometric functions
- Inverse hyperbolic trigonometric functions

The math library routines provide an user with standard C library functionality together with some additional mathematical functions that are commonly used in DSP.

The library functions extensively use the TMS320C67xx DSP chip parallel architecture and hardware floating point arithmetic capabilities to provide the best possible performance and accuracy.

The library functions have been algorithmically optimised at the assembly level and hand coded in assembly to obtain the maximum possible performance, and at the same time to provide for the maximum possible accuracy possible achievable in single precision arithmetic (32-bits IEEE-754 floating-point numbers). Therefore a user has a benefit of improved performance, which in some cases could be as 10 times as faster than that of the corresponding C functions. Usually the library functions would give 30% through 300% performance gain.

Most of the functions compute a result which is accurate in all decimal places of single precision format. The relative error is less than 1ULP, or -140dB.

FUNCTIONS

- **Algebraic Functions**
  - Absolute value (magnitude) of a real number
  - Round a number to the nearest even integer
  - Round a number toward zero (truncate)
  - Round a number up (toward +Infinity)
  - Round a number down (toward -Infinity)
  - Round a number using processor mode
  - Convert a real number to integer
  - Convert an integer number to real
  - Fractional and integer parts of a number
  - Mantissa and exponent of a number
  - Load exponent
  - x modulo y
  - Remainder of x/y
  - Sign transfer
  - Reciprocal value of a number
  - Floating point division
  - Square root of a number
  - Reciprocal square root of a number
  - Square root of sum of squares
  - A number raised to an integer power

- A number raised to a real power
- Set a number to +QNaN (macro)
- Set a number to +Inf (macro)
- Test if number is a NaN (macro)
- Test if a number is Infinite (macro)
- Test if a number is Finite (macro)

- **Exponential And Logarithmic Functions**
  - Base e exponent
  - Base 2 exponent
  - Base 10 (common) exponent
  - Base e (natural) logarithm
  - Base 2 logarithm
  - Base 10 (common) logarithm

- **Trigonometric Functions**
  - Sine
  - Cosine
  - Tangent
  - Cotangent
  - Sine (argument in [-pi/2,+pi/2])
  - Cosine (argument in [-pi,+pi])

- **Inverse Trigonometric Functions**
  - Arcsine
  - Arccosine
  - Arctangent
  - Arctangent of two arguments
  - Arccotangent
  - Arccotangent of two arguments

- **Hyperbolic Functions**
  - Hyperbolic sine
  - Hyperbolic cosine
  - Hyperbolic tangent
  - Hyperbolic cotangent

- **Inverse Hyperbolic Functions**
  - Hyperbolic arcsine
  - Hyperbolic arccosine
  - Hyperbolic arctangent
  - Hyperbolic arccotangent