

NAME

catanh, catanhf, catanhl – complex arc tangents hyperbolic

LIBRARY

Math library (*libm*, *-lm*)

SYNOPSIS

```
#include <complex.h>
```

```
double complex catanh(double complex z);
```

```
float complex catanhf(float complex z);
```

```
long double complex catanhl(long double complex z);
```

DESCRIPTION

These functions calculate the complex arc hyperbolic tangent of z . If $y = \operatorname{catanh}(z)$, then $z = \operatorname{ctanh}(y)$. The imaginary part of y is chosen in the interval $[-\pi/2, \pi/2]$.

One has:

$$\operatorname{catanh}(z) = 0.5 * (\operatorname{clog}(1 + z) - \operatorname{clog}(1 - z))$$

ATTRIBUTES

For an explanation of the terms used in this section, see [attributes\(7\)](#).

Interface	Attribute	Value
<code>catanh()</code> , <code>catanhf()</code> , <code>catanhl()</code>	Thread safety	MT-Safe

STANDARDS

C11, POSIX.1-2008.

HISTORY

glibc 2.1. C99, POSIX.1-2001.

EXAMPLES

```
/* Link with "-lm" */

#include <complex.h>
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>

int
main(int argc, char *argv[])
{
    double complex z, c, f;

    if (argc != 3) {
        fprintf(stderr, "Usage: %s <real> <imag>\n", argv[0]);
        exit(EXIT_FAILURE);
    }

    z = atof(argv[1]) + atof(argv[2]) * I;

    c = catanh(z);
    printf("catanh() = %6.3f %6.3f*i\n", creal(c), cimag(c));

    f = 0.5 * (clog(1 + z) - clog(1 - z));
    printf("formula = %6.3f %6.3f*i\n", creal(f), cimag(f));

    exit(EXIT_SUCCESS);
}
```

SEE ALSO**atanh(3), cabs(3), cimag(3), ctanh(3), complex(7)**