

**NAME**

catanh, catanhf, catanhl - complex arc tangents hyperbolic

**SYNOPSIS**

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

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

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

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

Link with *-lm*.

**DESCRIPTION**

The **catanh()** function calculates 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:

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

These functions first appeared in glibc in version 2.1.

**CONFORMING TO**

C99.

**EXAMPLE**

```
/* Link with "-lm" */
#include <complex.h>
#include <stdlib.h>
#include <unistd.h>
#include <stdio.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\(7\)](#)

**COLOPHON**

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