

**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**

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:

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

**VERSIONS**

These functions first appeared in glibc in version 2.1.

**ATTRIBUTES**

For an explanation of the terms used in this section, see **attributes(7)**.

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

**CONFORMING TO**

C99, POSIX.1-2001, POSIX.1-2008.

**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(f2), cimag(f2));

    exit(EXIT_SUCCESS);
}
```

**SEE ALSO**

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

**COLOPHON**

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