# Package 'RcppColors'

January 20, 2025

**Type** Package

**Title** Color Mappings and 'C++' Header Files for Color Conversion

**Version** 0.6.0

**Maintainer** Stéphane Laurent <laurent_step@outlook.fr>

**Description** Provides 'C++' header files to deal with color conversion from some color spaces to hexadecimal with 'Rcpp', and exports some color mapping functions for usage in R. Also exports functions to convert colors from the 'HSLuv' color space for usage in R. 'HSLuv' is a human-friendly alternative to HSL.

**License** GPL-3

**URL** https://github.com/stla/RcppColors

**BugReports** https://github.com/stla/RcppColors/issues

**Imports** Rcpp (>= 1.0.8)

**LinkingTo** Rcpp

**Encoding** UTF-8

**RoxygenNote** 7.2.3

**NeedsCompilation** yes

**Author** Stéphane Laurent [cre, aut], Scott Spencer [aut]

**Repository** CRAN

**Date/Publication** 2023-10-21 04:10:02 UTC

## Contents


RcppColors-package . . . . . 2
colorMap1 . . . . . 2
hsi . . . . . 6
hsl . . . . . 7
hsluv . . . . . 8
permuteRGB . . . . . 9

**Index** **11**

`RcppColors-package` *'C++' header files for conversion from some color spaces to hexadecimal.*

## Description

This package is mainly intended to be used with 'Rcpp', but it also provides some R functions for color conversion and color mappings.

## Details

See README for a description of the available 'C++' functions and how to use the package.

## Author(s)

Stéphane Laurent.

Maintainer: Stéphane Laurent <laurent_step@outlook.fr>

`colorMap1` *Color mappings functions*

## Description

Functions mapping each complex number to a color.

## Usage

```
colorMap1(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap2(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap3(
  Z,
```

```
  bkgcolor = "#15191e",
  nancolor = "#000000",
  s = 80,
  n = 5,
  nthreads = 1L
)

colorMap4(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap5(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap6(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap7(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap8(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap9(
```

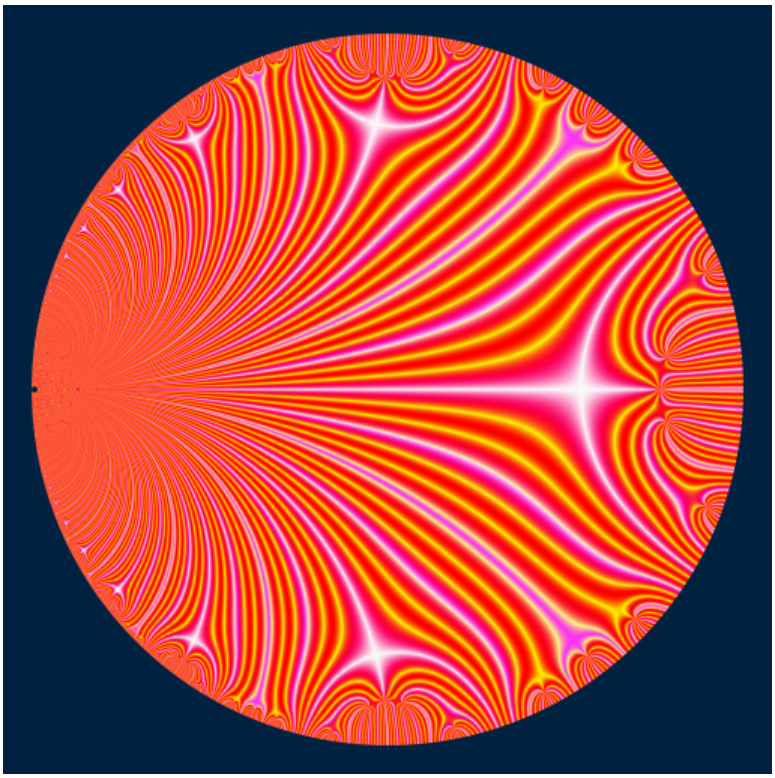
```
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap10(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap11(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap12(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap13(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)

colorMap14(
  Z,
  bkgcolor = "#15191e",
  nancolor = "#000000",
  reverse = c(FALSE, FALSE, FALSE),
  nthreads = 1L
)
```

## Arguments

| | |
|---|---|
| Z | complex number, vector or matrix |
| bkgcolor | background color; it is applied for the NA values of Z |
| nancolor | color for infinite and NaN values |
| reverse | logical vector of length three; for each component of the color space (e.g. R, G, B or H, S, L), whether to reverse it (e.g. R -> 255-R) |
| nthreads | number of threads used for parallel computation |
| s | saturation, a number between 0 and 100 |
| n | number of rays drawn in a cycle; it should be a positive integer but any non-zero numeric value is accepted |

## Value

A string or a character vector or a character matrix, having the same size as Z. Each entry is a color given by a hexadecimal string.



## Examples

```
library(RcppColors)

iota <- function(z){
```

```
  (z + 1i) / (1i*z + 1)
}
f <- function(z){
  q <- exp(2i * pi * z)
  r <- q - 4*q^2 + 2*q^3 + 8*q^4 - 5*q^5 - 8*q^6 + 6*q^7 - 23*q^9
  r / Mod(r)
}
g <- function(z){
  ifelse(
    Mod(z) >= 1,
    NA_complex_,
    f(iota(Conj(z)))
  )
}

x <- y <- seq(-1, 1, len = 1500)
W <- outer(y, x, function(x, y) complex(real = x, imaginary = y))
Z <- g(W)
image <- colorMap1(Z)

opar <- par(mar = c(0,0,0,0), bg = "#15191E")
plot(
  c(-100, 100), c(-100, 100), type = "n",
  xlab = "", ylab = "", axes = FALSE, asp = 1
)
rasterImage(image, -100, -100, 100, 100)
par(opar)
```

---

`hsi` *HSI color specification*

---

## Description

Converts a color given in HSI coordinates to a hexadecimal string.

## Usage

```
hsi(h = 360, s = 100, i = 100, alpha = NULL)
```

## Arguments

| | |
|---|---|
| `h` | the hue, a number between `0` and `360` |
| `s` | the saturation, a number between `0` and `100` |
| `i` | the intensity, a number between `0` and `100` |
| `alpha` | opacity, a number between `0` and `1`, or `NULL` |

## Value

The `hsi` function returns a hexadecimal string representing the corresponding color.

## Examples

```
saturation <- 100
f <- Vectorize(
  function(x, y){
    z <- complex(real = x, imaginary = y)
    modulus <- Mod(z)
    if(modulus > 1){
      return("#ffffff")
    }
    radians <- Arg(z)
    if(radians < 0){
      radians <- radians + 2*pi
    }
    degrees <- 360 * radians / 2 / pi
    hsi(h = degrees, s = saturation, i = 100*modulus)
  }
)

x <- y <- seq(-1, 1, length.out = 200L)
image <- outer(x, y, f)

opar <- par(mar = c(0, 0, 0, 0))
plot(NULL, xlim = c(-1, 1), ylim = c(-1, 1), asp = 1)
rasterImage(image, -1, -1, 1, 1)
par(opar)
```

---

# hsl *HSL color specification*

---

## Description

Converts a color given in HSL coordinates to a hexadecimal string.

## Usage

```
hsl(h = 360, s = 100, l = 100, alpha = NULL)
```

## Arguments

| | |
|---|---|
| h | the hue, a number between 0 and 360 |
| s | the saturation, a number between 0 and 100 |
| l | the lightness, a number between 0 and 100 |
| alpha | opacity, a number between 0 and 1, or NULL |

## Value

The hsl function returns a hexadecimal string representing the corresponding color.

## Examples

```
saturation <- 100
f <- Vectorize(
  function(x, y){
    z <- complex(real = x, imaginary = y)
    modulus <- Mod(z)
    if(modulus > 1){
      return("#ffffff")
    }
    radians <- Arg(z)
    if(radians < 0){
      radians <- radians + 2*pi
    }
    degrees <- 360 * radians / 2 / pi
    hsl(h = degrees, s = saturation, l = 100*modulus)
  }
)

x <- y <- seq(-1, 1, length.out = 200L)
image <- outer(x, y, f)

opar <- par(mar = c(0, 0, 0, 0))
plot(NULL, xlim = c(-1, 1), ylim = c(-1, 1), asp = 1)
rasterImage(image, -1, -1, 1, 1)
par(opar)
```

---

# hsluv *HSLuv color specification*

---

## Description

Converts a color given in HSLuv coordinates to a hexadecimal string or a RGB color specification.

## Usage

```
hsluv(h = 360, s = 100, l = 100, alpha = NULL)

hsluv2rgb(h = 360, s = 100, l = 100)
```

## Arguments

| | |
|---|---|
| h | the hue, a number between 0 and 360 |
| s | the saturation, a number between 0 and 100 |
| l | the lightness, a number between 0 and 100 |
| alpha | opacity, a number between 0 and 1, or NULL |

## Value

The `hsluv` function returns a hexadecimal string representing a color, and the `hsluv2rgb` returns the RGB coordinates of this color, a named vector of three integers between `0` and `255`.

## Examples

```
saturation <- 100
f <- Vectorize(
  function(x, y){
    z <- complex(real = x, imaginary = y)
    modulus <- Mod(z)
    if(modulus > 1){
      return("#ffffff")
    }
    radians <- Arg(z)
    if(radians < 0){
      radians <- radians + 2*pi
    }
    degrees <- 360 * radians / 2 / pi
    hsluv(h = degrees, s = saturation, l = 100*modulus)
  }
)

x <- y <- seq(-1, 1, length.out = 200L)
image <- outer(x, y, f)

opar <- par(mar = c(0, 0, 0, 0))
plot(NULL, xlim = c(-1, 1), ylim = c(-1, 1), asp = 1)
rasterImage(image, -1, -1, 1, 1)
par(opar)
```

---

# `permuteRGB` *RGB permutation*

---

## Description

Permutes the R-G-B components of a color.

## Usage

```
permuteRGB(hexcolor, permutation = "gbr")
```

## Arguments

| | |
|---|---|
| `hexcolor` | vector or matrix or array of hexadecimal colors |
| `permutation` | a character string with three letters `"r"`, `"g"` and `"b"` |

## Value

The colors after applying the permutation.

## Examples

```
library(RcppColors)
x <- y <- seq(-1.7, 1.7, length.out = 512L)
zarray <- outer(y, x, function(x, y) {
  z <- x + 1i*y
  (1 + 1i) * log(sin((z^3 - 1)))
})
# image
img1 <- colorMap1(zarray)
# r -> b, g -> r, b -> g
img2 <- permuteRGB(img1, "brg")
# plot
opar <- par(mar = c(0,0,0,0), mfrow = c(1, 2), bg = "#002240")
plot(
  c(0, 1), c(0, 1), type = "n", asp = 1,
  xlab = NA, ylab = NA, axes = FALSE
)
rasterImage(img1, 0, 0, 1, 1, interpolate = TRUE)
plot(
  c(0, 1), c(0, 1), type = "n", asp = 1,
  xlab = NA, ylab = NA, axes = FALSE
)
rasterImage(img2, 0, 0, 1, 1, interpolate = TRUE)
par(opar)
```

# Index

∗ **package**
RcppColors-package, 2

colorMap1, 2
colorMap10 *(*colorMap1*)*, 2
colorMap11 *(*colorMap1*)*, 2
colorMap12 *(*colorMap1*)*, 2
colorMap13 *(*colorMap1*)*, 2
colorMap14 *(*colorMap1*)*, 2
colorMap2 *(*colorMap1*)*, 2
colorMap3 *(*colorMap1*)*, 2
colorMap4 *(*colorMap1*)*, 2
colorMap5 *(*colorMap1*)*, 2
colorMap6 *(*colorMap1*)*, 2
colorMap7 *(*colorMap1*)*, 2
colorMap8 *(*colorMap1*)*, 2
colorMap9 *(*colorMap1*)*, 2

hsi, 6
hsl, 7
hsluv, 8
hsluv2rgb *(*hsluv*)*, 8

permuteRGB, 9

RcppColors *(*RcppColors-package*)*, 2
RcppColors-package, 2