# Package 'lppuw'

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**Version** 0.9.0

**Title** Linear Program based Phase UnWrapping

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**Requires** Matrix, zernike, rcbc, R (>= 3.6.3)

**Description** Two algorithms for linear programming based phase unwrappers

**Roxygen** list(markdown = TRUE)

**RoxygenNote** 7.1.1

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`brcutpuw` *Linear program based phase unwrapping*

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### Description

`brcutpuw` implements a branch cut algorithm for phase unwrapping

### Usage

```
brcutpuw(phase, pen = 0, details = FALSE, trace = 1)

netflowpuw(phase, wts = NULL, details = FALSE, trace = 1)
```

## Arguments

| | |
|---|---|
| phase | matrix with phase map to be unwrapped (phases are in radians) |
| pen | penalty for making a branch cut from a residue to an edge (brcutpuw only) |
| details | Return some details of the solution? |
| trace | Send some info from the LP solver to the console? |
| wts | matrix of weights for cost function with same dimension as phase (netflowpuw only) |

## Details

This package implements two distinct algorithms for two dimensional phase unwrapping that can be set up and solved as general linear programs. The linear programs are solved using the LP solver CBC from COIN-OR using the interface provided by the package rcbc.

## Value

The unwrapped wavefront in units of fringes. If details is TRUE additional details of the solution are returned in a named list with the first member puw containing the unwrapped wavefront.

## Functions

- brcutpuw: Branch cut algorithm for phase unwrapping
- netflowpuw: Network flow algorithm for phase unwrapping

## Note

According to the documentation for rcbc different levels of detail from the LP solver can be printed with trace levels up to 15, however the same output seems to be returned for all values. Setting trace=0 will produce silent output, which may not be advisable since these can take some time to run.

## See Also

There is a function with the same name brcutpuw in package zernike.

## Examples

```
data("phasemaps", package="lppuw")
mtext(zernike::rmap(phi, plot=TRUE))
wf.bc <- brcutpuw(phi)
wf.nf <- netflowpuw(phi, mod)
zernike::plot.pupil(wf.nf, col=zernike::rygcb(400))
cat("Summary of the difference between the two unwrapped wavefronts:\n")
zernike::summary.pupil(wf.nf - wf.bc)
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