Package 'TPDDev'

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Type Package

Title Tool for Construction of Two-Phase Experimental Designs

Version 1.0.0

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Description Provides functions to construct two-phase design layouts, compute treatment- and block-incidence matrices, derive C-
matrices for residual, direct, and interaction effects, and calculate the efficiency factor for two-phase experimental designs with factorial treatment structure.

License GPL-3

Encoding UTF-8

RoxygenNote 7.3.2

Imports MASS, Matrix

Depends R (>= 4.0)

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

NeedsCompilation no

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TPDDev *Two-Phase Experimental Design Development*

Description

'TPDDev()' constructs a two-phase experimental design layout, computes the information matrices for residual, direct, and interaction effects, and calculates the efficiency factor.

Usage

```
TPDDev(d1, base_d2)
```

Arguments

d1	Numeric matrix. Phase-I layout (rows = blocks, columns = plots per block).
base_d2	Numeric matrix. Base Phase-II layout (rows = blocks, columns = plots per block).

Details

Steps performed:

1. Checks that 'ncol(d1)' equals 'nrow(base_d2)'.
2. Expands the Phase-II layout for each Phase-I block.
3. Builds the combined layout and treatment-incidence matrices.
4. Computes block-incidence matrix and overall mean matrix.
5. Derives overall C-matrix for factorial treatment effects.
6. Projects C-matrix to obtain residual, direct, and interaction effect matrices.
7. Calculates the efficiency factor of the design.

Value

A list containing design parameters, combined two-phase design layout, information matrices, and efficiency factor.

Examples

```
d1 <- matrix(c(
  1,2,3,4,5,6,7,
  2,3,4,5,6,7,8,
  3,4,5,6,7,8,1,
  4,5,6,7,8,1,2,
  5,6,7,8,1,2,3,
  6,7,8,1,2,3,4,
  7,8,1,2,3,4,5,
  8,1,2,3,4,5,6
), nrow = 8, byrow = TRUE)
```

```
base_d2 <- matrix(c(
  1,2,4,
  2,3,5,
  3,4,6,
  4,5,7,
  5,6,1,
  6,7,2,
  7,1,3
), ncol = 3, byrow = TRUE)

result <- TPDDev(d1, base_d2)
result$efficiency_factor
result$C_dir
```

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