Package ‘PileBetaGR’

October 2, 2024

Type Package

Title Geometric reliability analysis for piles

Version 4.3.2

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Description Geometric reliability analysis for piles. The PileBetaGR develops for geotechnical engineers to perform geometric reliability analyses for piles at a site. Firstly, observed load-displacement data at various site globally are presented, and there are 780 measured curves across 31 sites. The load displacement data at different load levels for each curve are presented. Secondly, regression parameters of loading test databases are derived. For the CFG pile, containing length, diameter, maximum loading, maximum settlement, Kur, and curve regression parameters (p1 , p2 , h1 , and h2); for the pile-soil intermediate (PSI) containing bearing plate area, maximum bearing pressure, maximum settlement, Kur, and regression parameters (p1 , p2 , h1 , and h2). For the other piles containing location, site, type, No, length, diameter, slenderness, regression parameters (p1 , p2), maximum-load, ID. Thirdly, the source code of the geometric reliability analyses for piles at a site are provided.

License GPL (>= 3)

Encoding UTF-8

LazyData true

RoxygenNote 7.3.2

NeedsCompilation no

Depends R (>= 3.5.0)

R topics documented:

`PileBetaGR-package` *PileBetaGR-package*

Description

Regression parameters of pile loading-settlements curves, some useful functions for geometric reliability analysis for piles

Details

Package:	PileBetaGR
Type:	Package
Version:	1.0
Date:	2024-1-02
License:	GNU 4.12 or later

LazyLoad: yes

Author(s)

Xing Zheng Wu Maintainer: <xingzhengwu@gmail.com>

References

Wu X.Z., Liu H. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 2023, 23(9):04023148. Wu X.Z., Liu H., Wang R.K. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 2023, 176(2):118-131. Wu X.Z., Xin J.X. Geometric reliability analysis of composite foundations comprising cement-fly ash-gravel piles at site-specific scale. Journal of Testing and Evaluation, 2021, 49(4):2779-2799. Wu X.Z., Xin J.X. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 2019, 59(5):1613-1630.

Examples

```
## listing the data for regression parameters of CFG pile in Wu and Xin 2019
CFGRegPars
## listing the data for regression parameters of pile-soil intermediate in Wu ad Xin 2021
PSIRegPars
## llisting the data for regression parameters of piles in Wu et al 2023
P1P2GERegPars
## listing the data for regression parameters of piles in Wu and Liu 2023
P1P2GlobeRegPars
## listing the data for load displacement curves of piles in Wu and Liu 2023
CurveGlobeQpssP01
```

2dContour — *Construction of the two dimensional contour using inverse Nataf transformation*

Description

Application to a solve the critical contour and reliability index associated with two variables

Arguments

p1	scale parameter of the power law regression
p2	shape parameter of the power law regression
rho	correlation coefficient between p1 and p2

Details

The case study discusses the generation of joint probability density contour with a correlated bivariate distribution.

Value

Returns a probability density contour.

Note

This subroutine can be run after calling the contour-based reliability method, i.e., CBRM-Wu.

Please read the following references:

[1] Wang R.K., Wu X.Z. Solving the geometric reliability index for a case involving multivariate random variables in the original physical space. Quality and Reliability Engineering International, 2023, 39(7):3102-3118.

[2] Wu X.Z., Ma C.Z., Wang R.K., Li W.C. Development of environmental contours from rainfall intensity and duration data for slopes. Natural Hazards, 2023, 116(1):1001-1027.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Examples

```
##---- Should be DIRECTLY executable !! ----
library(fitdistrplus)
library(PileBetaGR)
beta_star<-2.3 #can be specified as any value
Rho12<--0.67 #Wu and Liu 2023
data(P1P2MihalikRegPars)
P1P2MihalikRegPars
ParsS<-matrix(NA, nrow=nrow(P1P2MihalikRegPars),ncol=3)

ParsS[,1:2]<-as.matrix(P1P2MihalikRegPars[,9:10])
Parametersp11<-fitdist(as.numeric(ParsS[,1]), "norm",method="mme")[1]$estimate[1]
Parametersp12<-fitdist(as.numeric(ParsS[,1]), "norm",method="mme")[1]$estimate[2]
bestDist01<-"norm"
Parametersp21<-fitdist(as.numeric(ParsS[,2]), "norm",method="mme")[1]$estimate[1]
Parametersp22<-fitdist(as.numeric(ParsS[,2]), "norm",method="mme")[1]$estimate[2]
bestDist02<-"norm"
qmargdist<-function(yyTmp, bestDist, Par01, Par02){
 if (bestDist=="norm") {
  qmargd<-qnorm(yyTmp,Par01,Par02)
 }else if ((bestDist=="lnorm")) {
  qmargd<-qlnorm(yyTmp,Par01,Par02)
 }else if ((bestDist=="gamma")) {
  qmargd<-qgamma(yyTmp,Par01,Par02)
 }else if ((bestDist=="weibull")) {
  qmargd<-qweibull(yyTmp,Par01,Par02)
 }
 return(qmargd)
}
transferStand2Environ<-function(beta_star,Rho12,bestDist01,Parametersp11,Parametersp12,
```

```
  bestDist02,Parametersp21,Parametersp22){
 n_point=200
 angle = seq(0, 2*pi, length.out = n_point+1)
 u1mat=rep(beta_star, each=n_point+1)*cos(angle)
 u2mat=rep(beta_star, each=n_point+1)*sin(angle)
 y1mat=pnorm(u1mat)
 y2mat=pnorm(u2mat*sqrt(1-Rho12 ^2)+Rho12*u1mat)
 #  p1mat=qgamma(y1mat,shape=Parametersp11,rate=Parametersp12)
 p1mat=qmargdist(y1mat,bestDist01,Parametersp11,Parametersp12)
 #  p2mat=qweibull(y2mat,shape=Parametersp21,scale=Parametersp22)
 p2mat=qmargdist(y2mat,bestDist02,Parametersp21,Parametersp22)
 list(p1mat=p1mat,p2mat=p2mat)
}

ECxy<-transferStand2Environ(beta_star,Rho12,bestDist01,Parametersp11,Parametersp12,
  bestDist02,Parametersp21,Parametersp22)
ECxy
plot(ECxy$p1mat,ECxy$p2mat)
```

3dContour *Construction of the three dimensional contour using inverse Nataf transformation*

Description

Application to a solve the critical contour and reliability index associated with three variables

Arguments

p1	scale parameter of the power law regression
p2	shape parameter of the power law regression
Qdead	dead load
rho	correlation coefficient between p1 and p2

Details

The case study discusses the generation of joint probability density contour with a correlated trivariate distribution.

Value

Returns a 3d probability density contour.

Note

This subroutine can be run after calling the contour-based reliability method, i.e., CBRM-Wu.

Please read the following references:

[1] Wang R.K., Wu X.Z. Solving the geometric reliability index for a case involving multivariate random variables in the original physical space. Quality and Reliability Engineering International, 2023, 39(7):3102-3118.

[2] Wu X.Z., Ma C.Z., Wang R.K., Li W.C. Development of environmental contours from rainfall intensity and duration data for slopes. Natural Hazards, 2023, 116(1):1001-1027.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Examples

```
##---- Should be DIRECTLY executable !! ----
library(fitdistrplus)
library(PileBetaGR)
beta_star<-2.3 #can be specified as any value
rho12<--0.67 #Wu and Liu 2023
data(P1P2MihalikRegPars)
P1P2MihalikRegPars
ParsS<-matrix(NA, nrow=nrow(P1P2MihalikRegPars),ncol=3)

ParsS[,1:3]<-as.matrix(P1P2MihalikRegPars[,9:11])
Parametersp11<-fitdist(as.numeric(ParsS[,1]), "norm",method="mme")[1]$estimate[1]
Parametersp12<-fitdist(as.numeric(ParsS[,1]), "norm",method="mme")[1]$estimate[2]
bestDist01<-"norm"
Parametersp21<-fitdist(as.numeric(ParsS[,2]), "norm",method="mme")[1]$estimate[1]
Parametersp22<-fitdist(as.numeric(ParsS[,2]), "norm",method="mme")[1]$estimate[2]
bestDist02<-"norm"
qmargdist<-function(yyTmp, bestDist, Par01, Par02){
 if (bestDist=="norm") {
  qmargd<-qnorm(yyTmp,Par01,Par02)
 }else if ((bestDist=="lnorm")) {
  qmargd<-qlnorm(yyTmp,Par01,Par02)
 }else if ((bestDist=="gamma")) {
  qmargd<-qgamma(yyTmp,Par01,Par02)
 }else if ((bestDist=="weibull")) {
  qmargd<-qweibull(yyTmp,Par01,Par02)
 }
 return(qmargd)
}

MeanMaxTestLoad<-mean(as.numeric(ParsS[,3]))
mean33Tmp<-MeanMaxTestLoad*0.5 #Qmax/2
cov33<-0.1
sd33Tmp<-mean33Tmp*cov33
meanlog<-log(mean33Tmp*mean33Tmp/sqrt(mean33Tmp*mean33Tmp+sd33Tmp*sd33Tmp))
#meanlog
sdlog<-sqrt(log((mean33Tmp*mean33Tmp+sd33Tmp*sd33Tmp)/(mean33Tmp*mean33Tmp)))
#sdlog
mean3=round(meanlog,2); sd3=round(sdlog,2)

numgrid3<-30
transferUnit2Physical3D<-function(beta_star){
 M  <- mesh(seq(0, 2*pi, length.out = numgrid3),   seq(0,   pi, length.out = numgrid3))
 u  <- M$x ; v  <- M$y

 u1mat <- beta_star*cos(u)*sin(v)
```

```
 u2mat <- beta_star*sin(u)*sin(v)
 u3mat <- beta_star*cos(v)
 #i=1-----------------------------------------------------
 xx1=qmargdist(pnorm(u1mat),bestDist01,Parametersp11,Parametersp12)
 #i=2-----------------------------------------------------
 Rho21<-matrix(RR[2,1],nr=1)
 Rho21=as.numeric(Rho21)
 Uc2=Rho21*u1mat
 zegmac2=sqrt(1-Rho21 ^2)
 asx2=u2mat*zegmac2+Uc2
 xx2=qmargdist(pnorm(asx2),bestDist02,Parametersp21,Parametersp22)
 #i=3------------------------------------------------------
 Rho12<-matrix(RR[1,2],nr=1)
 Rho12<-as.numeric(Rho12)
 Rho13<-matrix(RR[1,3],nr=1)
 Rho13<-as.numeric(Rho13)
 Rho23<-matrix(RR[2,3],nr=1)
 Rho23<-as.numeric(Rho23)
 Uc3=((Rho13-Rho12*Rho23)*u1mat+(Rho23-Rho12*Rho13)*u2mat)/(1-Rho12^2)
 zegmac3=sqrt(1-Rho12^2-Rho13^2-Rho23^2+2*Rho12*Rho13*Rho23)/sqrt(1-Rho12^2)
 asx3=u3mat*zegmac3+Uc3
 xx3=qlnorm(pnorm(asx3), meanlog=mean3, sdlog=sd3)
 list(xx1,xx2,xx3)
}
library(plot3D)
RR<-matrix(NA,nrow=3,ncol=3)
RR[1,1]<-1; RR[2,2]<-1; RR[3,3]<-1
RR[1,2]<--0.67; RR[2,1]<--0.67
RR[1,3]<-0; RR[3,1]<-0
RR[2,3]<-0; RR[3,2]<-0

res_x<-transferUnit2Physical3D(beta_star)
xx1_p <- res_x[[1]]
xx2_p <- res_x[[2]]
xx3_p <- res_x[[3]]
surf3D(xx1_p,xx2_p,xx3_p,alpha =1 , phi =20,theta=120,ticktype = "detailed",
 colkey = FALSE, facets = FALSE,col = "blue",
 bty = "g",lwd=2,xlim=c(min(xx1_p),max(xx1_p)*1.2), ylim=c(min(xx2_p),max(xx2_p)*1.2),
 zlim =c(min(xx3_p),max(xx3_p)*1.2),xlab = "p1", ylab = "p2",zlab="Qdead")
```

`CFGRegPars` *Regression parameters for the load versus settlement curves of the CFG pile*

Description

Data sets covers the regression parameters via hyperbolic and power law

Usage

```
CFGRegPars(h1, h2)
CFGRegPars(p1, p2)
```

Arguments

h1	a hyperbolic regression parameter
h2	a hyperbolic regression parameter
p1	a power law regression parameter
p2	a power law regression parameter

Details

The data set contains several columns : no, diameter, length, Qmax, Smax, Kur, p1, p2, h1, h2.

Value

Returns a matrix that contains above values for each sites included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ. 2017. Implementing multivariate fitting and reliability analyses for geotechnical engineering problems in R. Georisk, 11(2):173-188.

See Also

Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles at site-specific scale. Journal of Testing and Evaluation, 49(4):277-2799.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CFGRegPars)
CFGRegPars[["name"]]  ##column named "name"

which(CFGRegPars[["name"]]=="TZCFG")  ##returns a vector of the indices of x
which(CFGRegPars[["type"]]=="CP")  ##returns a vector of the indices of x at a site
CFGRegPars[which(CFGRegPars[["type"]]=="CP"),]  ##listing a matrix where the site = 'CP'
CFGRegPars[which(CFGRegPars[["type"]]=="CP"),7:8]
 ##listing a matrix where the p1-p2 parameters at site = 'CP'
CFGRegPars[which(CFGRegPars[["type"]]=="CP"),9:10]
 ##listing a matrix where the h1-h2 parameters at site = 'CP'
```

CurveCFGQpssAP	*Load displacement data for each test at the site AP by Wu and Xin 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveCFGQpssAP(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveCFGQpssAP)
CurveCFGQpssAP[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveCFGQpssAP[3,]    ##listing a matrix for curves where the 3th load level
```

CurveCFGQpssBP *Load displacement data for each test at the site BP by Wu and Xin 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveCFGQpssBP(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles at site-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveCFGQpssBP)
CurveCFGQpssBP[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveCFGQpssBP[3,]    ##listing a matrix for curves where the 3th load level
```

CurveCFGQpssCP — *Load displacement data for each test at the site CP by Wu and Xin 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveCFGQpssCP(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles at site-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveCFGQpssCP)
CurveCFGQpssCP[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveCFGQpssCP[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveCFGQpssDP` *Load displacement data for each test at the site DP by Wu and Xin 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveCFGQpssDP(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles at site-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveCFGQpssDP)
CurveCFGQpssDP[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveCFGQpssDP[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveCFGQpssEP` *Load displacement data for each test at the site EP by Wu and Xin 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveCFGQpssEP(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles at site-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveCFGQpssEP)
CurveCFGQpssEP[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveCFGQpssEP[3,]    ##listing a matrix for curves where the 3th load level
```

CurveCFGQpssFP — *Load displacement data for each test at the site FP by Wu and Xin 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveCFGQpssFP(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles at site-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveCFGQpssFP)
CurveCFGQpssFP[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveCFGQpssFP[3,]    ##listing a matrix for curves where the 3th load level
```

CurveGEQpssA1 — *Load displacement data for each test at the site A1 by Park etal 2012*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGEQpssA1(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Park S, Roberts LA, and Misra A (2012) Design methodology for axially loaded auger cast-in-place and drilled displacement piles. Journal of Geotechnical and Geoenvironmental Engineering ASCE 138(12): 1431-1441.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGEQpssA1)
CurveGEQpssA1[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGEQpssA1[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGEQpssA2` *Load displacement data for each test at the site A2 by Park etal 2012*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGEQpssA2(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Author(s)

Xingzheng Wu `<xingzhengwu@gmail.com>`

References

[1] Park S, Roberts LA, and Misra A (2012) Design methodology for axially loaded auger cast-in-place and drilled displacement piles. Journal of Geotechnical and Geoenvironmental Engineering ASCE 138(12): 1431-1441.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGEQpssA2)
CurveGEQpssA2[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGEQpssA2[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGEQpssB1` *Load displacement data for each test at the site B1 by Prakoso 2016*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGEQpssB1(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Prakoso WA (2016) Case studies on variability in soils and driven pile performance. Proceedings of the 5th International Conference on Geotechnical and Geophysical Site Characterisation. Barry M. Lehane, Hugo E. Acosta-Martinez, Richard Kelly, Australian Geomechanics Society: 1259-1264.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGEQpssB1)
CurveGEQpssB1[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGEQpssB1[3,]    ##listing a matrix for curves where the 3th load level
```

CurveGEQpssB2 *Load displacement data for each test at the site B2 by Prakoso 2016*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGEQpssB2(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Author(s)

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References

[1] Prakoso WA (2016) Case studies on variability in soils and driven pile performance. Proceedings of the 5th International Conference on Geotechnical and Geophysical Site Characterisation. Barry M. Lehane, Hugo E. Acosta-Martinez, Richard Kelly, Australian Geomechanics Society: 1259-1264.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGEQpssB2)
CurveGEQpssB2[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGEQpssB2[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGEQpssB3` *Load displacement data for each test at the site B3 by Prakoso 2016*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGEQpssB3(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Author(s)

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References

[1] Prakoso WA (2016) Case studies on variability in soils and driven pile performance. Proceedings of the 5th International Conference on Geotechnical and Geophysical Site Characterisation. Barry M. Lehane, Hugo E. Acosta-Martinez, Richard Kelly, Australian Geomechanics Society: 1259-1264.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGEQpssB3)
CurveGEQpssB3[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGEQpssB3[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGEQpssC1` *Load displacement data for each test at the site C1 by Zhou et al 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGEQpssC1(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Zhou J, Zhang L, Zhang X, Jiang H and Oh E (2019) Behavior of displacement concrete pile under compressive loads. International Journal of GEOMATE 16(54): 200-208.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGEQpssC1)
CurveGEQpssC1[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGEQpssC1[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGEQpssC2` *Load displacement data for each test at the site C2 by Zhou et al 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGEQpssC2(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Author(s)

Xingzheng Wu `<xingzhengwu@gmail.com>`

References

[1] Zhou J, Zhang L, Zhang X, Jiang H and Oh E (2019) Behavior of displacement concrete pile under compressive loads. International Journal of GEOMATE 16(54): 200-208.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGEQpssC2)
CurveGEQpssC2[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGEQpssC2[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGlobeQpssP01` *Load displacement data for each test at the site P01 by Brandl H. 2005*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP01(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

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References

[1] Brandl H. 2005. Cyclic preloading of piles to minimize differential settlements of high-rise buildings. Slovak Journal of Civil Engineering (eingeladen), XIII(3):1-12.

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP01)
CurveGlobeQpssP01[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP01[3,]    ##listing a matrix for curves where the 3th load level
```

CurveGlobeQpssP02 *Load displacement data for each test at the site P02 by Evangelista et al 1977*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP02(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

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[1] Evangelista A, Pellegrino A, Viggiani C. 1977. Variability among piles of the same foundation. IX Int. Conf. Soil Mech. Found. Eng, 493-500.

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP02)
CurveGlobeQpssP02[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP02[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGlobeQpssP03` *Load displacement data for each test at the site P03 by HHET 2018*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP03(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Hebei Huayu Engineering Testing Co., Ltd. (HHET) 2018. Testing for prestressed high-strength concrete pipe piles in Hebei Hongyu Tianxi garden.

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP03)
CurveGlobeQpssP03[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP03[3,]    ##listing a matrix for curves where the 3th load level
```

CurveGlobeQpssP04 *Load displacement data for each test at the site P04 by HHET 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP04(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Hebei Huayu Engineering Testing Co., Ltd. (HHET) 2019. Testing for prestressed concrete pipe piles in Hebei Hongyu Jiuxitai residential community.

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP04)
CurveGlobeQpssP04[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP04[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGlobeQpssP05` *Load displacement data for each test at the site P05 by HHET 2020*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP05(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <`xingzhengwu@gmail.com`>

References

[1] Hebei Huayu Engineering Testing Co., Ltd. (HHET) 2020. Testing for cement fly-ash gravel (CFG) piles in Hebei Hongyu Ziyuntai residential community.

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP05)
CurveGlobeQpssP05[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP05[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGlobeQpssP06` *Load displacement data for each test at the site P06 by HJCT 2018*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP06(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Hebei Jicang Construction Technology Co., Ltd. (HJCT) 2018. Testing for piles in Hebei Hongyu Longxiyuan residential community.

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP06)
CurveGlobeQpssP06[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP06[3,]    ##listing a matrix for curves where the 3th load level
```

CurveGlobeQpssP07 *Load displacement data for each test at the site P07 by HJCT 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP07(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Hebei Jicang Construction Technology Co., Ltd. (HJCT) 2019. Testing for foundation piles in the workshop of Hebei high-end equipment manufacturing hub.

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP07)
CurveGlobeQpssP07[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP07[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGlobeQpssP08` *Load displacement data for each test at the site P08 by Karlsrud 2013*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP08(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

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[1] Karlsrud (2013): Summary and evaluation of pile test results. NGI Report: Time effects on pile capacity. Doi: 20061251-00-279-R

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP08)
CurveGlobeQpssP08[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP08[3,]    ##listing a matrix for curves where the 3th load level
```

CurveGlobeQpssP09 *Load displacement data for each test at the site P09 by Lu et al 2019*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP09(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Lu S, Zhang J, Xu H, Zhang Y. 2019. Test and research for key technology of cast-in-place pile construction in the area of silt-rock fill layer. International Journal of Mechatronics, 1(6):203-212.

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP09)
CurveGlobeQpssP09[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP09[3,]    ##listing a matrix for curves where the 3th load level
```

`CurveGlobeQpssP10` *Load displacement data for each test at the site P10 by Mahakhotchasenichai et al 2018*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP10(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <`xingzhengwu@gmail.com`>

References

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See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP10)
CurveGlobeQpssP10[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP10[3,]    ##listing a matrix for curves where the 3th load level
```

CurveGlobeQpssP11 *Load displacement data for each test at the site P11 by Sun et al 2014*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP11(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Sun HW, Chang WH, Gong ZC, Wang Y. 2014. Calculation and analysis of piled raft foundation interaction of China ZUN Tower. Building Structure, 44(20):109-114. (in Chinese)

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP11)
CurveGlobeQpssP11[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP11[3,]    ##listing a matrix for curves where the 3th load level
```

CurveGlobeQpssP12 — *Load displacement data for each test at the site P12 by Tawfik et al 2015*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveGlobeQpssP12(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Tawfik MM, Loschner J, El-Mossallamy YM. Characteristic estimate of pile bearing capacity from pile load tests on socketed drilled shafts in weathered rock. International Journal of Geotechnical Engineering, 2015, 9(2):201-208.

See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveGlobeQpssP12)
CurveGlobeQpssP12[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveGlobeQpssP12[3,]    ##listing a matrix for curves where the 3th load level
```

CurveMihalikQpssBridge *Load displacement data for each test at the site Bridge by Mihalik et al 2023*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurveMihalikQpssBridge(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

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See Also

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

[2] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles at site-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[3] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurveMihalikQpssBridge)
CurveMihalikQpssBridge[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurveMihalikQpssBridge[3,]    ##listing a matrix for curves where the 3th load level
```

`CurvePSIQpssAI` *Load displacement data for each test at the site AI by Wu and Xin 2021*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurvePSIQpssAI(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurvePSIQpssAI)
CurvePSIQpssAI[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurvePSIQpssAI[3,]    ##listing a matrix for curves where the 3th load level
```

CurvePSIQpssBI *Load displacement data for each test at the site BI by Wu and Xin 2021*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurvePSIQpssBI(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurvePSIQpssBI)
CurvePSIQpssBI[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurvePSIQpssBI[3,]    ##listing a matrix for curves where the 3th load level
```

CurvePSIQpssCI — *Load displacement data for each test at the site CI by Wu and Xin 2021*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurvePSIQpssCI(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurvePSIQpssCI)
CurvePSIQpssCI[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurvePSIQpssCI[3,]    ##listing a matrix for curves where the 3th load level
```

CurvePSIQpssDI — *Load displacement data for each test at the site DI by Wu and Xin 2021*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurvePSIQpssDI(Q1, s1)
```

Arguments

`Q1`	a load parameter
`s1`	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurvePSIQpssDI)
CurvePSIQpssDI[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurvePSIQpssDI[3,]    ##listing a matrix for curves where the 3th load level
```

`CurvePSIQpssEI` *Load displacement data for each test at the site EI by Wu and Xin 2021*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurvePSIQpssEI(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurvePSIQpssEI)
CurvePSIQpssEI[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurvePSIQpssEI[3,]    ##listing a matrix for curves where the 3th load level
```

CurvePSIQpssFI *Load displacement data for each test at the site FI by Wu and Xin 2021*

Description

Data sets covers the load displacement data of each curve

Usage

```
CurvePSIQpssFI(Q1, s1)
```

Arguments

Q1	a load parameter
s1	a displacement parameter

Details

The data set contains several columns : Q1[1], s1[1], Q2[2], s2[2], Q3[3], s3[3], Q4[4], s4[4],...

Value

Returns a matrix that contains above values for each sites under different load levels included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

See Also

[1] Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

[2] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering, 176(2):118-131.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(CurvePSIQpssFI)
CurvePSIQpssFI[,1:2]   ##listing a matrix for the first curve where the Q1, s1
CurvePSIQpssFI[3,]    ##listing a matrix for curves where the 3th load level
```

`P1P2GERegPars` *Regression parameters for the load versus settlement curves by Park et al. (2012), Park et al. (2012), and Zhou et al. (2019)*

Description

Data sets covers the regression parameters via power law

Usage

```
P1P2GERegPars(p1, p2)
```

Arguments

p1	a power law regression parameter
p2	a power law regression parameter

Details

The data set contains twelve columns : Investigator, location, site, type, no, length, diameter, slenderness, p1, p2, Qmax, ID.

Value

Returns a matrix that contains above values for each sites included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliabilityindex of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering. 176(2):118-131.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

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See Also

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[2] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(P1P2GERegPars)
P1P2GERegPars[["name"]]  ##column named "name"

which(P1P2GERegPars[["location"]]=="Kansas" & P1P2GERegPars[["site"]]=="Northern")
 ##returns a vector of the indices of x
which(P1P2GERegPars[["location"]]=="Shandong" & P1P2GERegPars[["type"]]=="ZoneC")
 ##returns a vector of the indices of x at a site
```

```
P1P2GERegPars[which(P1P2GERegPars[["type"]]=="pp"),]
 ##listing a matrix where the site is 'pp'
P1P2GERegPars[which(P1P2GERegPars[["type"]]=="pp"),9:10]
 ##listing a matrix where the p1 p2 parameters at site is 'pp'
```

P1P2GlobeRegPars *Regression parameters for the load versus settlement curves all site across the globe*

Description

Data sets covers the regression parameters via power law

Usage

```
P1P2GlobeRegPars(p1, p2)
```

Arguments

p1	a power law regression parameter
p2	a power law regression parameter

Details

The data set contains twelve columns : Investigator, location, site, type, no, length, diameter, slenderness, p1, p2, Qmax, ID.

Value

Returns a matrix that contains above values for each sites included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliability index of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering. 176(2):118-131.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

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[1] Wu XZ. 2017. Implementing multivariate fitting and reliability analyses for geotechnical engineering problems in R. Georisk, 11(2):173-188.

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[8] Hebei Jicang Construction Technology Co., Ltd. (HJCT) 2018. Testing for piles in Hebei Hongyu Longxiyuan residential community.

[9] Hebei Jicang Construction Technology Co., Ltd. (HJCT) 2019. Testing for foundation piles in the workshop of Hebei high-end equipment manufacturing hub.

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[14] Tawfik MM, Loschner J, El-Mossallamy YM. Characteristic estimate of pile bearing capacity from pile load tests on socketed drilled shafts in weathered rock. International Journal of Geotechnical Engineering, 2015, 9(2):201-208.

See Also

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[2] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(P1P2GlobeRegPars)
P1P2GlobeRegPars[["name"]]  ##column named "name"

which(P1P2GlobeRegPars[["location"]]=="Vienna" & P1P2GlobeRegPars[["site"]]=="P01")
 ##returns a vector of the indices of x
which(P1P2GlobeRegPars[["location"]]=="Hejian" & P1P2GlobeRegPars[["type"]]=="PHC")
 ##returns a vector of the indices of x at a site
P1P2GlobeRegPars[which(P1P2GlobeRegPars[["type"]]=="DShaft"),]
 ##listing a matrix where the site is 'DShaft'
P1P2GlobeRegPars[which(P1P2GlobeRegPars[["type"]]=="DShaft"),9:10]
 ##listing a matrix where the p1 p2 parameters at site is 'DShaft'
```

P1P2MihalikRegPars *Regression parameters for the load versus settlement curves by Mihalik et al. (2023)*

Description

Data sets covers the regression parameters via power law

Usage

```
P1P2MihalikRegPars(p1, p2)
```

Arguments

p1	a power law regression parameter
p2	a power law regression parameter

Details

The data set contains twelve columns : Investigator, location, site, type, no, length, diameter, slenderness, p1, p2, Qmax, ID.

Value

Returns a matrix that contains above values for each sites included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Liu H, Wang RK. 2023. Determination of geometric reliabilityindex of piles at site-specific scale: case studies. Proceedings of the Institution of Civil Engineers: Geotechnical Engineering. 176(2):118-131.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Mihalik J, Gago F, Vlcek J, Drusa M. Evaluation of methods based on CPTu testing for prediction of the bearing capacity of CFA piles. Applied Sciences, 2023, 13, 2931.

See Also

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles atsite-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

[2] Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(P1P2MihalikRegPars)
P1P2MihalikRegPars[["name"]]  ##column named "name"

which(P1P2MihalikRegPars[["location"]]=="Slovakia" & P1P2MihalikRegPars[["site"]]=="Bridge15")
  ##returns a vector of the indices of x
P1P2MihalikRegPars[which(P1P2MihalikRegPars[["type"]]=="CFA"),]
  ##listing a matrix where the site is 'pp'
```

`Power law regression` *Solving of regression parameters for the power law function*

Description

Application to a load displacement curve

Arguments

p1	scale parameter
p2	shape parameter

Details

The case study demostrates the solution with a nls (nonlinear least squares) function.

Value

Returns p1 and p2.

Note

Please read the following references for the original data (adopted from):

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

Wu XZ. 2017. Implementing multivariate fitting and reliability analyses for geotechnical engineering problems in R. Georisk, 11(2):173-188.

See Also

Wu X.Z., Xin J.X. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing the code.
library(PileBetaGR) #for dataset
data(CurveMihalikQpssBridge)
ResList<- CurveMihalikQpssBridge

nLines<-length(ResList[1,])/2
ParsS<-matrix(nrow=nLines,ncol=3)
for (kk in 1:nLines) {
 ResSettle<-cbind(ResList[,kk*2-1],ResList[,kk*2] )
 xy0<- ResSettle
 n_maxSett<-which.max(ResSettle[,1])
 xy<-xy0[1:n_maxSett,]
 xx0<-xy[,2];yy0<-xy[,1]
 parab_nlm1<-nls(yy0~aa00*xx0^bb00,start = list(aa00=5638,bb00=0.64))
 ParsS[kk,2]<-round(summary(parab_nlm1)$par[2],6)
 ParsS[kk,1]<-round(summary(parab_nlm1)$par[1],6)
 ParsS[kk,3]<-xy0[n_maxSett,1]
}
MeanMaxTestLoad<-mean(ParsS[,3])
ParsS
#p1 p2 maxLoad for each curve
```

PSIRegPars — *Regression parameters for the pressure versus settlement curves of the pile-soil intermediate (PSI)*

Description

Data sets covers the regression parameters via hyperbolic and power law

Usage

```
PSIRegPars(h1, h2)
PSIRegPars(p1, p2)
```

Arguments

h1	a hyperbolic regression parameter
h2	a hyperbolic regression parameter
p1	a power law regression parameter
p2	a power law regression parameter

Details

The data set contains several columns : no, area, Pmax, Smax, Kur, p1, p2, 10000*h1, 100*h2.

Value

Returns a matrix that contains above values for each sites included in the data set.

Note

Please read the following references for the original data (adopted from):

[1] Wu XZ, Xin JX. 2021. Geometric reliability analysis ofcomposite foundations comprising cement-fly ash-gravel piles at site-specific scale. Journal of Testing and Evaluation, 49(4):2779-2799.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

[1] Wu XZ. 2017. Implementing multivariate fitting and reliability analyses for geotechnical engineering problems in R. Georisk, 11(2):173-188.

See Also

Wu XZ, Xin JX. 2019. Probabilistic analysis of site-specific load-displacement behaviour of cement-fly ash-gravel piles. Soils and Foundations, 59(5):1613-1630.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- listing data.
data(PSIRegPars)
PSIRegPars[["name"]]  ##column named "name"

which(PSIRegPars[["name"]]=="TZPSI")  ##returns a vector of the indices of x
which(PSIRegPars[["type"]]=="CI")  ##returns a vector of the indices of x at a site
PSIRegPars[which(PSIRegPars[["type"]]=="CI"),]  ##listing a matrix where the site = 'CI'
PSIRegPars[which(PSIRegPars[["type"]]=="CI"),6:7]
 ##listing a matrix where the p1-p2 parameters at site = 'CI'
PSIRegPars[which(PSIRegPars[["type"]]=="CI"),8:9]
 ##listing a matrix where the h1-h2 parameters at site = 'CI'
```

SolveBetaG2d — *Derivation of the critical two dimensional contour using the segmented searching algorithm by Dr Wu Xing Zheng*

Description

Solve the critical contour and reliability index associated with two variables

Arguments

p1	scale parameter of the power law regression
p2	shape parameter of the power law regression
rho	correlation coefficient between p1 and p2

Details

The case study discusses the solution of the critical joint probability density contour with a correlated bivariate distribution.

Value

Returns a geometric reliability index.

Note

This subroutine can be run after calling the contour-based reliability method, i.e., CBRM-Wu.

Please read the following references:

[1] Wang R.K., Wu X.Z. Solving the geometric reliability index for a case involving multivariate random variables in the original physical space. Quality and Reliability Engineering International, 2023, 39(7): 3102-3118.

[2] Wu X.Z., Ma C.Z., Wang R.K., Li W.C. Development of environmental contours from rainfall intensity and duration data for slopes. Natural Hazards, 2023, 116(1):1001-1027.

[3] Wu X.Z., Ma C.Z., Wang R.K., Zhang J. Multivariate reliability method using the environment contour model based on C-vine copulas. Ocean Engineering, 2024, 299:117282,1-15.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Examples

```
##---- Should be DIRECTLY executable !! ----
library(fitdistrplus)
library(PileBetaGR)
beta_star<-2.3 #can be specified as any value
Rho12<--0.67 #Wu and Liu 2023
data(P1P2MihalikRegPars)
#P1P2MihalikRegPars
ParsS<-matrix(NA, nrow=nrow(P1P2MihalikRegPars),ncol=3)

ParsS[,1:2]<-as.matrix(P1P2MihalikRegPars[,9:10])
Parametersp11<-fitdist(as.numeric(ParsS[,1]), "norm",method="mme")[1]$estimate[1]
Parametersp12<-fitdist(as.numeric(ParsS[,1]), "norm",method="mme")[1]$estimate[2]
bestDist01<-"norm"
Parametersp21<-fitdist(as.numeric(ParsS[,2]), "norm",method="mme")[1]$estimate[1]
Parametersp22<-fitdist(as.numeric(ParsS[,2]), "norm",method="mme")[1]$estimate[2]
bestDist02<-"norm"
qmargdist<-function(yyTmp, bestDist, Par01, Par02){
 if (bestDist=="norm") {
  qmargd<-qnorm(yyTmp,Par01,Par02)
 }else if ((bestDist=="lnorm")) {
  qmargd<-qlnorm(yyTmp,Par01,Par02)
 }else if ((bestDist=="gamma")) {
```

```
  qmargd<-qgamma(yyTmp,Par01,Par02)
 }else if ((bestDist=="weibull")) {
  qmargd<-qweibull(yyTmp,Par01,Par02)
 }
 return(qmargd)
}
transferStand2Environ<-function(beta_star,Rho12,bestDist01,Parametersp11,Parametersp12,
  bestDist02,Parametersp21,Parametersp22){
 n_point=200
 angle = seq(0, 2*pi, length.out = n_point+1)
 u1mat=rep(beta_star, each=n_point+1)*cos(angle)
 u2mat=rep(beta_star, each=n_point+1)*sin(angle)
 y1mat=pnorm(u1mat)
 y2mat=pnorm(u2mat*sqrt(1-Rho12 ^2)+Rho12*u1mat)
 #  p1mat=qgamma(y1mat,shape=Parametersp11,rate=Parametersp12)
 p1mat=qmargdist(y1mat,bestDist01,Parametersp11,Parametersp12)
 #  p2mat=qweibull(y2mat,shape=Parametersp21,scale=Parametersp22)
 p2mat=qmargdist(y2mat,bestDist02,Parametersp21,Parametersp22)
 list(p1mat=p1mat,p2mat=p2mat)
}

FosS<-2.0
TmpSettleAllow<-40
MeanMaxTestLoad<-mean(as.numeric(as.matrix(P1P2MihalikRegPars[,11])))
fff2d<-function(p1Spec,p2Spec,MeanMaxTestLoad){
 SettleAllowable<-TmpSettleAllow
 Rq<-p1Spec*SettleAllowable**p2Spec    #power law relation Qua
 Sq<-MeanMaxTestLoad/FosS
 FOSTotal<-Rq-Sq #g = Qua - QLD
 FOSTotal
}
#Segmented Searching Method by Xingzheng Wu
betaMin<-0
betaMax<-10
jloop=0
Increment<-1.0
iCountLoop<-1
for (jloop in 1:11){
 beta_mat<-seq(betaMin,betaMax,Increment)
 beta_star<-beta_mat[jloop]
 res_x<-transferStand2Environ(beta_star,Rho12,bestDist01,Parametersp11,Parametersp12,
   bestDist02,Parametersp21,Parametersp22)
 xx1 <- res_x[[1]]
 xx2 <- res_x[[2]]
 asz1<-fff2d(xx1,xx2,MeanMaxTestLoad)
 if (any(asz1<0)){
  xxx11<-xx1[which.min(asz1)]
  xxx22<-xx2[which.min(asz1)]
  betaMin<-beta_star-Increment
  betaMax<-beta_star
  Increment<-Increment*0.1
  iCountLoop<-iCountLoop+1
  if (iCountLoop>5) break #0.0001 precision
 }
}
realBetaG<-round(beta_star,3)
realBetaG
```

iCountLoop

SolveBetaG3d *Derivation of the critical two dimensional contour using the segmented searching algorithm by Dr Wu Xing Zheng*

Description

Solve the critical contour and reliability index associated with two variables

Arguments

p1	scale parameter of the power law regression
p2	shape parameter of the power law regression
rho	correlation coefficient between p1 and p2

Details

The case study discusses the solution of the critical joint probability density contour with a correlated bivariate distribution.

Value

Returns a geometric reliability index.

Note

This subroutine can be run after calling the contour-based reliability method, i.e., CBRM-Wu.

Please read the following references:

[1] Wang R.K., Wu X.Z. Solving the geometric reliability index for a case involving multivariate random variables in the original physical space. Quality and Reliability Engineering International, 2023, 39(7):3102-3118.

[2] Wu X.Z., Ma C.Z., Wang R.K., Li W.C. Development of environmental contours from rainfall intensity and duration data for slopes. Natural Hazards, 2023, 116(1):1001-1027.

[3] Wu X.Z., Ma C.Z., Wang R.K., Zhang J. Multivariate reliability method using the environment contour model based on C-vine copulas. Ocean Engineering, 2024, 299:117282,1-15.

Author(s)

Xingzheng Wu <xingzhengwu@gmail.com>

References

Wu X.Z., Liu H. 2023. Development of environmental contours from site-specific regression parameters of load-settlement curves for piles: the global database. International Journal of Geomechanics, 23(9):04023148.

Examples

```
##---- Should be DIRECTLY executable !! ----
library(fitdistrplus)
library(PileBetaGR)
beta_star<-2.3 #can be specified as any value
rho12<--0.67 #Wu and Liu 2023
data(P1P2MihalikRegPars)
P1P2MihalikRegPars
ParsS<-matrix(NA, nrow=nrow(P1P2MihalikRegPars),ncol=3)

ParsS[,1:3]<-as.matrix(P1P2MihalikRegPars[,9:11])
Parametersp11<-fitdist(as.numeric(ParsS[,1]), "norm",method="mme")[1]$estimate[1]
Parametersp12<-fitdist(as.numeric(ParsS[,1]), "norm",method="mme")[1]$estimate[2]
bestDist01<-"norm"
Parametersp21<-fitdist(as.numeric(ParsS[,2]), "norm",method="mme")[1]$estimate[1]
Parametersp22<-fitdist(as.numeric(ParsS[,2]), "norm",method="mme")[1]$estimate[2]
bestDist02<-"norm"
qmargdist<-function(yyTmp, bestDist, Par01, Par02){
 if (bestDist=="norm") {
  qmargd<-qnorm(yyTmp,Par01,Par02)
 }else if ((bestDist=="lnorm")) {
  qmargd<-qlnorm(yyTmp,Par01,Par02)
 }else if ((bestDist=="gamma")) {
  qmargd<-qgamma(yyTmp,Par01,Par02)
 }else if ((bestDist=="weibull")) {
  qmargd<-qweibull(yyTmp,Par01,Par02)
 }
 return(qmargd)
}

MeanMaxTestLoad<-mean(as.numeric(ParsS[,3]))
mean33Tmp<-MeanMaxTestLoad*0.5 #Qmax/2
cov33<-0.1
sd33Tmp<-mean33Tmp*cov33
meanlog<-log(mean33Tmp*mean33Tmp/sqrt(mean33Tmp*mean33Tmp+sd33Tmp*sd33Tmp))
#meanlog
sdlog<-sqrt(log((mean33Tmp*mean33Tmp+sd33Tmp*sd33Tmp)/(mean33Tmp*mean33Tmp)))
#sdlog
mean3=round(meanlog,2); sd3=round(sdlog,2)

numgrid3<-30
transferUnit2Physical3D<-function(beta_star){
 M  <- mesh(seq(0, 2*pi, length.out = numgrid3),   seq(0,   pi, length.out = numgrid3))
 u  <- M$x ; v  <- M$y

 u1mat <- beta_star*cos(u)*sin(v)
 u2mat <- beta_star*sin(u)*sin(v)
 u3mat <- beta_star*cos(v)
 #i=1------------------------------------------------------
 xx1=qmargdist(pnorm(u1mat),bestDist01,Parametersp11,Parametersp12)
 #i=2------------------------------------------------------
 Rho21<-matrix(RR[2,1],nr=1)
 Rho21=as.numeric(Rho21)
 Uc2=Rho21*u1mat
 zegmac2=sqrt(1-Rho21 ^2)
 asx2=u2mat*zegmac2+Uc2
```

```
 xx2=qmargdist(pnorm(asx2),bestDist02,Parametersp21,Parametersp22)
 #i=3-------------------------------------------------------
 Rho12<-matrix(RR[1,2],nr=1)
 Rho12<-as.numeric(Rho12)
 Rho13<-matrix(RR[1,3],nr=1)
 Rho13<-as.numeric(Rho13)
 Rho23<-matrix(RR[2,3],nr=1)
 Rho23<-as.numeric(Rho23)
 Uc3=((Rho13-Rho12*Rho23)*u1mat+(Rho23-Rho12*Rho13)*u2mat)/(1-Rho12 ^2)
 zegmac3=sqrt(1-Rho12 ^2-Rho13 ^2-Rho23 ^2+2*Rho12*Rho13*Rho23)/sqrt(1-Rho12 ^2)
 asx3=u3mat*zegmac3+Uc3
 xx3=qlnorm(pnorm(asx3), meanlog=mean3, sdlog=sd3)
 list(xx1,xx2,xx3)
}
library(plot3D)
RR<-matrix(NA,nrow=3,ncol=3)
RR[1,1]<-1; RR[2,2]<-1; RR[3,3]<-1
RR[1,2]<--0.67; RR[2,1]<--0.67
RR[1,3]<-0; RR[3,1]<-0
RR[2,3]<-0; RR[3,2]<-0

res_x<-transferUnit2Physical3D(beta_star)
xx1_p <- res_x[[1]]
xx2_p <- res_x[[2]]
xx3_p <- res_x[[3]]

FosS<-2.0
TmpSettleAllow<-40
fff2d<-function(p1Spec,p2Spec,MeanMaxTestLoad){
 SettleAllowable<-TmpSettleAllow
 Rq<-p1Spec*SettleAllowable**p2Spec    #power law relation Qua
 Sq<-MeanMaxTestLoad/FosS
 FOSTotal<-Rq-Sq #g = Qua - QLD
 FOSTotal
}
#Segmented Searching Method
betaMin<-0
betaMax<-10
jloop=0
Increment<-1.0
iCountLoop<-1
for (jloop in 1:11){
 beta_mat<-seq(betaMin,betaMax,Increment)
 beta_star<-beta_mat[jloop]
 res_x<-transferUnit2Physical3D(beta_star)
 xx1 <- res_x[[1]]
 xx2 <- res_x[[2]]
 xx3 <- res_x[[3]]
 asz1<-fff2d(xx1,xx2,xx3)
 if (any(asz1<0)){
  xxx11<-xx1[which.min(asz1)]
  xxx22<-xx2[which.min(asz1)]
  xxx33<-xx3[which.min(asz1)]
  betaMin<-beta_star-Increment
  betaMax<-beta_star
  Increment<-Increment*0.1
  iCountLoop<-iCountLoop+1
```

```
  if (iCountLoop>5) break #0.0001 precision
 }
}
realBetaG<-round(beta_star,3)
realBetaG
iCountLoop
```

Index