USAGE

```
Pen.LME(y, X, Z, subject, t.fracs = seq(1, 0.05, -0.05), eps = 10^(-4))
```

ARGUMENTS

y	Vector of responses. This should be centered to have mean zero.
X	Matrix of predictors for fixed effects. Each column should be centered to have mean zero. There should not be a column for the intercept. The model will not be fit with an intercept.
Z	Matrix of predictors for random effects. There should not be a column for the intercept. The random intercept will be added to the design by default.
subject	Vector of same length as response to identify the subject.
t.fracs	Grid of penalty parameters at which solution is computed. This is parameterized as fraction of the full estimate. All values must be between 0 and 1. A t.frac of zero would result in an estimate with all zeros. Best will be chosen via BIC.
eps	Convergence criterion for the EM algorithm. For shorter runtime criterion should be less strict.

VALUE

fixed	Estimated coefficients for fixed effects chosen by minimum BIC.
stddev	Estimated standard deviations for random effects. The first is the random intercept.
corr	Estimated correlation matrix for the random effects.
sigma.2	Estimated value of the residual variance.
t.frac	The best fraction value chosen by BIC from the input grid points.
BIC	Value of BIC for each of the fraction values computed.

REFERENCE

Bondell, H. D., Krishna, A., and Ghosh, S. K. (2009). Joint Variable Selection for Fixed and Random Effects in Linear Mixed-Effects Models. Under Revision for *Biometrics*.

EXAMPLE

```
# This is the first simulation example from the paper.
# The grid of fraction values is taken from 0.05 to 1 in steps of 0.025

require(mvtnorm)
n.i = 5
n = 30
y = NULL
X = NULL
Z = NULL
subject = kronecker(1:30, rep(1,5))
true.beta = c(1, 1, rep(0,7))
true.D = matrix(c(9,4.8,0.6,0, 4.8,4,1,0, .6,1,1,0, 0,0,0,0), nrow=4, ncol=4)
for (i in 1:n)
{
        Xi = cbind(matrix(runif(45,-2,2), nrow=5))
        Zi = cbind(1,matrix(runif(15,-2,2), nrow=5))
        X = rbind(X, Xi)
        Z = rbind(Z, Zi[,-1])
        S = Zi%*%true.D%*%t(Zi) + diag(5)
        y = rbind(y, t(rmvnorm(1, Xi%*%true.beta, S)) )
}
Pen.LME(y, X, Z, subject, t.fracs = seq(0.05, 1, .025) )
```