INVERSE HEAT CONDUCTION Ill-posed Problems

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Heat conduction Matlab function for the X12B-0T0 case using a piecewise-constant approximation (pca): **fdX12B_0T0_pca.m**

Syntax

```
fdX12B_0T0_pca(xd,td,p,A,M)
```

Description

fdX12B_0T0_pca (*xd*, *td*, *p*, *A*, *M*) returns the dimensionless temperature *Td* at a given dimensionless location *xd* from the heated surface, between 0 and 1, and at a given dimensionless time *td*, when a time variation of the surface temperature having *p* as an exponent (positive or negative) is applied. Also, it calls the fdX12B10T0 (*xd*, *td*, *A*) building block function that is computed with an accuracy of 10^{-A} (*A* = 2, 3, …, 15), while *M* indicates the number of time steps chosen up to the dimensionless time *td* of interest.

If *xd* and *td* are not single values but arrays (length(*xd*) = *m* and length(*td*) = *n*) defining the dimensionless locations and times of interest, respectively, the above function returns the dimensionless temperature *Td* as a double (2D) subscripted array, where size(*Td*) = [*m*, *n*].

Examples

Example 1

```
>> Td=fdX12B_0T0_pca(.1,.1,2,3,10)

Td =

   0.006023155341616
```

Example 2

```
>> fdX12B_0T0_pca(.1,.1,2,3,1000)
```

```
ans =

   0.006131431101088
```

Example 3

```
>> Td=fdX12B_0T0_pca(1,.1,-1,10,10)

Td =

   4.327427827183392
```

Example 4

```
>> xd=[0.1 0.5 0.7]'

xd =

   0.100000000000000
   0.500000000000000
   0.700000000000000

>> td=[0.01 0.2]'

td =

   0.010000000000000
   0.200000000000000

>> Td=fdX12B_0T0_pca(xd,td,3,5,100)

Td =

   0.000000143594874   0.005309314063313
   0.000000000002445   0.000900203621756
   0.000000000000001   0.000349920295383
```