INVERSE HEAT CONDUCTION Ill-posed Problems

2nd Edition, WILEY, 2023

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Heat conduction Matlab function for the X22B-0T0 case using a piecewise-constant approximation (pca): **fdX22B_0T0_pca.m**

Syntax

```
fdX22B_0T0_pca(xd,td,p,A,M)
```

Description

fdX22B_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 heat flux having *p* as an exponent (positive or negative) is applied. Also, it calls the fdX22B10T0 (*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=fdX22B_0T0_pca(0,.1,2,3,10)

Td =

   0.001859698764145
```

Example 2

```
>> fdX22B_0T0_pca(0,.1,2,3,1000)
```

```
ans =

   0.001903019112105
```

Example 3

```
>> Td=fdX22B_0T0_pca(0,.5,-1,3,10)

Td =

   5.127519712688364
```

Example 4

```
>> xd=[0 0.25 0.5]'

xd =

                   0
   0.250000000000000
   0.500000000000000

>> td=[0.01 0.2]'

td =

   0.010000000000000
   0.200000000000000

>> Td=fdX22B_0T0_pca(xd,td,3,5,100)

Td =

   0.000000051514728   0.001843077611639
   0.000000000166766   0.000599270806564
   0.000000000000068   0.000178990131216
```