p: Voronoi "center" of grains

	x-coor	y-coor
# of grains		

x: x-coordinates of nodes (before x-fem)

y: y-coordinates of nodes (before x-fem)

X: x-coordinates of nodes (after x-fem)

Y: y-coordinates of nodes (after x-fem)

node: connectivity array of parent elements

CONN: connectivity array of all elements

Some Data Structures: Constructed by "Beam"

GRAININFO_ARR: struct 1 × (# of grains)

grain are numbered in same way as defined by "p"

PARENTELEM_INFO: 1 × (# of elements/subelements)

flag: # of parent. or

-1 means cut element

SUBELEM_INFO: 1 × (# of elements) struct

.parent = 0 if no subelements
# of self otherwise

.no_kids = # of daughter elements

.kids = daughter elem ids

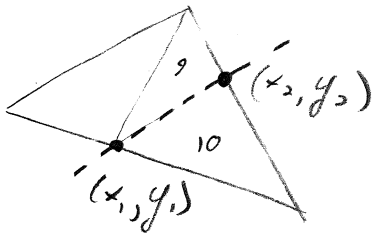
NODAL_ENRICH: 1 × (# of real nodes)

.cnt : # of basis functions (unenriched = 1)

.enrichment: [# # #]

: is number of a grain, value means node is enriched w/ grain.

INT_INTERFACE: 1 × (# of elements)



.parent = parent element

.pairings = 1 [9 10] 2 subelements on either side of subsegment

.shared = 1 $\left\{ \begin{bmatrix} x_1 & y_1 \\ x_2 & y_2 \end{bmatrix} \right\}$ intersection points

:id_dof: (# of nodes) × 6 + **:d_eqns**

	original		x basis 1	y basis 1	x basis 2	y basis 2	
:id_dof	-1	-2	2	2	0	0	← node enriched w/ grain 2
	-1	-2	0	0	0	0	← unenriched node
	'	'	1	1	2	2	← node enriched w/ grain 1 & 2
	'	'					
# nodes	#	#	#	#	0	0	
	#	#	0	0	0	0	
			#	#	#	#	

:d_eqns

: is eqn number associated w/ node & enrichment from slot in :id_dof

Some Data Structures: Passed to FEA

vx: 2 × (# of segments)

segment #

	x-coord 1
	x-coord 2

seg-cut-info: (# of segments) × (max # of sub-segments)

seg-cut-info(i,j).xint: intersection points of sub segment on element [seg-cut-info(i,j), elemno]

dimensions (# of intersections × 2)

intersection #	x-coor	y-coor

ELEMINFO_ARR: 1 × (# of elements/subelements) struct

- nb_subelts: = # of subelements :? 1 if no subelements
- subelemids: -1 if no subelements

cutlist: 1 × (# of original elements) flags

0 if uncut, otherwise, # of grains

elemgrainmap: (# of elements) × (# of grains)

Flag = 1 if element contains grain

0 otherwise

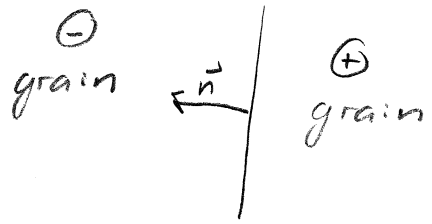
NODEINFO_ARR. 1× (# of real nodes)

.multi-grains number of grains associated w/ node's element

.areas

	# of grains
# of grains	
area of elem "inside"	
% of total elem area	

pos-g, neg-g: Within a subsegment loop, hold values of grain #'s on "positive" & "negative" sides



n_nodes: within a subsegment loop there is a parent element with nodes $\begin{bmatrix} n1 \\ n2 \\ n3 \end{bmatrix}$ from global connectivity array.

pn_nodes hold flags $\begin{bmatrix} \# \\ \# \\ \# \end{bmatrix}$ # = 1 if positively enriched

= 0 if negatively enriched.