Explanation on use of Matlab files
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Tesselator.m:

**PURPOSE:** tesselate the two-dimensional area into polygons and determine geometrical characteristics of polygons.

**INPUT:**

- `XPART` – Array with x-coordinates of particles.
- `YPART` – Array with y-coordinates of particles.
- `P1, P2` – List of contacts. The contacts must be sorted ascendingly, first on `P1`, then on `P2`. Thus, contact 'ic' consists of `P1(ic) ↔ P2(ic)`.
- `BOX` – The periodic box. This is a structure with elements `xmin`, `ymin`, `xmax` and `ymax`.

**OUTPUT:**

- `NPOL` – Number of polygons.
- `POLS` – Array of structures with information on polygons. `POLS(ipol).nvert` gives the number of vertices in polygon 'ipol'; `POLS(ipol).verts(ivert)`, `ivert = 1...POLS(ipol).nvert` gives the vertices in this polygon.
- `L1, L2` – Arrays with indices of polygons associated with each contact. Thus, each contact 'ic' is an edge of two polygons, `L1(ic)→L2(ic)`.
- `LV` – Matrix of size `NCONT` (number of contacts) by 2. Row 'ic' gives the (transposed) branch vector of the contact 'ic'.
- `HV` – Matrix of size `NCONT` (number of contacts) by 2. Row 'ic' gives the polygon vector of the contact 'ic'.
- `XPOL` – Array with x-coordinate of centres of polygons.
- `YPOL` – Array with y-coordinate of centres of polygons.
- `APOL` – Array with areas of polygons.

ContactRelativeDisplacements.m:

**PURPOSE:** determine the relative displacement due to the displacement of particle centres at all contacts.

**INPUT:**

- `XPART1` – Array with x-coordinates of particles for initial assembly.
- `YPART1` – Array with y-coordinates of particles for initial assembly.
- `XPART2` – Array with x-coordinates of particles for current assembly.
- `YPART2` – Array with y-coordinates of particles for current assembly.
- `P1, P2` – List of contacts. The contacts must be sorted ascendingly, first on `P1`, then on `P2`. Thus, contact 'ic' consists of `P1(ic) ↔ P2(ic)`.
BOX1 – The periodic box for the initial configuration. This is a structure with elements xmin, ymin, xmax and ymax.

BOX2 – The periodic box for the current configuration. This is a structure with elements xmin, ymin, xmax and ymax.

OUTPUT: DV – Matrix of size NCONT (the number of contacts) by 2. Row 'ic' gives the relative displacement vector of the contact 'ic'.

MicroStrain.m:

PURPOSE: determine the strain-increment tensor according to the micro-mechanical expression of Kruyt&Rothenburg (1996).

INPUT: DV – Matrix of size NCONT (the number of contacts) by 2. Row 'ic' gives the relative displacement vector of the contact 'ic'.

HV – Matrix of size NCONT (the number of contacts) by 2. Row 'ic' gives the polygon vector of the contact 'ic'.

BOX – The periodic box for current assembly. This is a structure with elements xmin, ymin, xmax and ymax.

OUTPUT: deps – Matrix of size 2 by 2 containing the strain-increment tensor.

Auxiliary files

Some auxiliary files are included: ‘DiffPoints.m’, ‘DrawCircle.m’, ‘FindContact.m’, ‘PlotPolygon.m’, ‘ReadAssembly.m’.