Appendix

A.1 Ansys Code to Estimate Inertial Tensor

/prep7

..

!Definition of keypoints using the CT data

..

!!

!! to make areas

!!

*get,nkp,kp,0,count

*do,i,1,nkp/3

a,3*i-2,3*i-1,3*i

*enddo

!!

!!to merge in order to have only one entity in each position

!!

NUMMRG,ALL, , , ,LOW

!!

!!to make a volume

va,all

!!

```
!!
ET,1,SOLID187
!*
!*
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,DENS,1,,2.8 !Definition of cortical bone density
MPTEMP,,,,,,,,
MPTEMP,1,0
MPDATA,DENS,2,,1.5 !Definition of trabecular bone density
VATT, 1, , 1, 0
LESIZE,ALL, , ,2, ,1, , ,1,
MSHKEY,0
MSHAPE,1,3d
CM,Y,VOLU
VSEL, , , , 1
CM,Y1,VOLU
CHKMSH,'VOLU'
CMSEL,S,Y
!*
VMESH,Y1
!*
CMDELE,Y
CMDELE,Y1
CMDELE,Y2
!*
nsel,r,ext
esln
cm,eext,element
esel,all
cmsel,u,eext
eplot
```

!!!!!!!!!!!second layer (if it is necessary)

!nsle

!nsel,r,ext

!esln

!cmsel,a,eext

!cm,eext,element

!esel,all

!cmsel,u,eext

!!!!!!!!!!!

cm,eint,element

MPCHG,2,all,

allsel,all

!! MPTEMP,,,,,,,,

MPTEMP,1,0

MPDATA,EX,1,,2.1e10

MPDATA,PRXY,1,,0.3

MPTEMP,,,,,,,,

MPTEMP,1,0

MPDATA,EX,2,,2.1e10

MPDATA,PRXY,2,,0.3

!!

FINISH

/SOL

!* ANTYPE,0

..

!To constrain the motion of several nodes in order to avoid the rigid solid motion

..

irlf,-1

```
solve
*DIM,inertialtensor,array,1,6
*GET,inertialtensor(1,1),elem,0,imc,x !Inertial tensor in the center of gravity
*GET,inertialtensor(1,2),elem,0,imc,y
*GET,inertialtensor(1,3),elem,0,imc,z
*GET,inertialtensor(1,4),elem,0,imc,xy
*GET,inertialtensor(1,5),elem,0,imc,yz
*GET,inertialtensor(1,6),elem,0,imc,zx
!
*DIM,massmatrix,array,1,3 !Mass matrix
*GET,massmatrix(1,1),elem,0,mtot,x
*GET,massmatrix(1,2),elem,0,mtot,y
*GET,massmatrix(1,3),elem,0,mtot,z
!!
!!

    !Save the results in a text file

    ∗cfopen,/scratch/tmp/Results/2dens28101capa,txt,
∗vwrite,massmatrix(1,1),inertialtensor(1,1),inertialtensor(1,2),inertialtensor(1,3)
(4F18.6)
∗cfclose
```

A.2 Procedure to get a rougher mesh in BLENDER

- Open a new blender file and delete everything: press A twice (select all) and then X (delete).
- Import the stl file: File/Import/STL
- Select the mesh (rightclick) and enter editmode (TAB)
- Start the script: Mesh/Scripts/Poly Reducer
- Change some settings in order to get what you need.
- Run the script as many times as you need to reduce polygons until the faces are big enough