**Study 2**

**Part 1)**

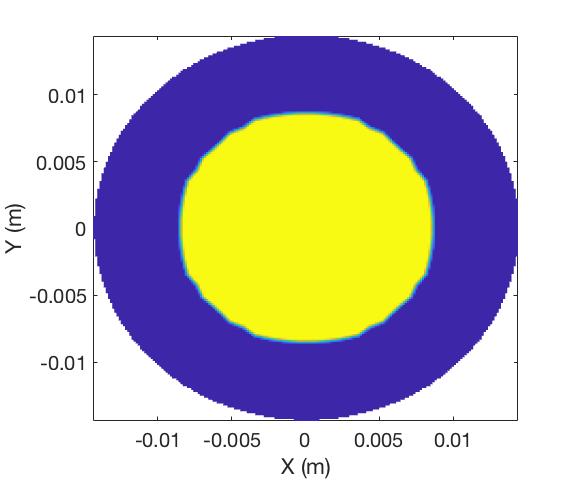
Human healthy femur:

Cortical material: G=4GPa

Trabecular material: G=13GPa

R2

A close up of a logo

Description automatically generated1. Section 1

R1

R1=8.63mm

R2=14.60mm

Angle of twist per unit length: 0.0010 rad/m

Numerical Torsional rigidity: 362.6740 N.m^2/rad

Total torque: 0.3627 N.m

Max stress resultant: 0.1192 MPa

A picture containing object

Description automatically generatedA close up of a logo

Description automatically generated2. Section 2

R2

R1

R0

R1=8.63mm

R2=14.60mm

R0=4mm

Angle of twist per unit length: 0.0010 rad/m

Torsional rigidity: 357.1231 N.m^2/rad

Total torque: 0.3571 N.m

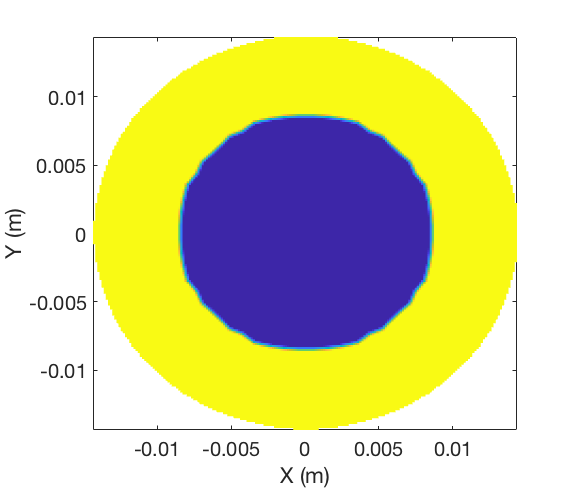
Max stress resultant: 0.1192 MPa

3. Section 3

R2

R1

A close up of a logo

Description automatically generated

R1=8.63mm

R2=14.60mm

Angle of twist per unit length: 0.0010 rad/m

Torsional rigidity: 249.8702 N.m^2/rad

Total torque: 0.2499 N.m

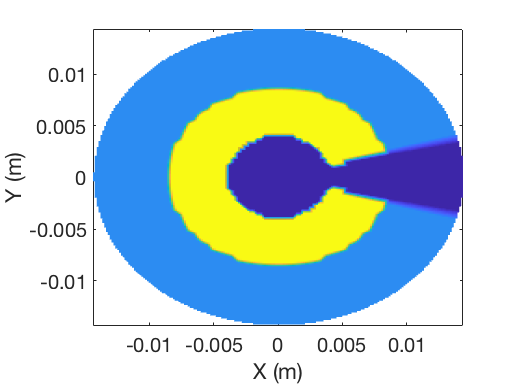
Max stress resultant: 0.0577 MPa

**Part 2)**

Fracture angle: pi/6

1. Human femur (section 2) with fracture:

A close up of a map

Description automatically generated

R2

R1

R0

Angle of twist per unit length: 0.0010 rad/m

Torsional rigidity: 328.7975 N.m^2/rad

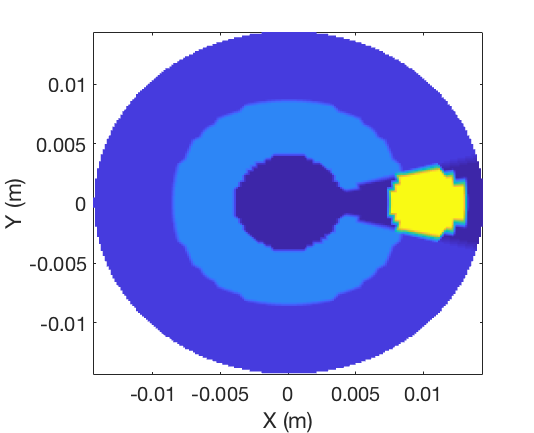
Total torque: 0.3288 N.m

Max stress resultant: 0.1306 MPa

**Part 3)**

1. Human femur (section 2) and metal bar

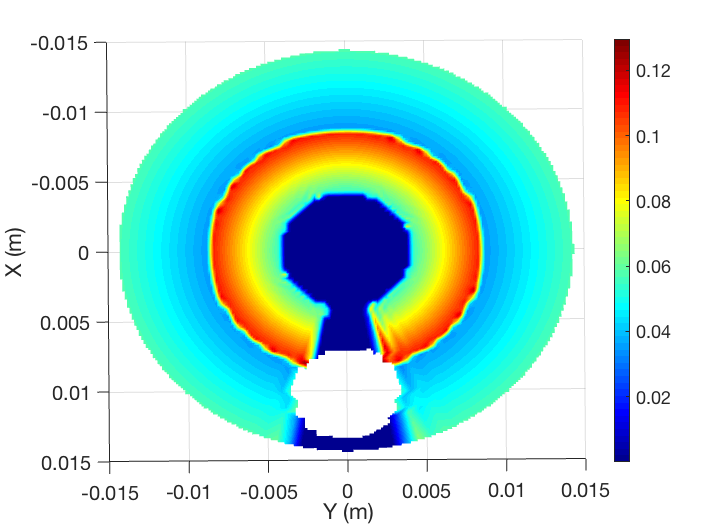
A close up of a logo

Description automatically generated

R2

R1

R0



A close up of a logo

Description automatically generated

Angle of twist per unit length: 0.0010 rad/m

Torsional rigidity: 451.4984 N.m^2/rad

Total torque: 0.4515 N.m

Max stress resultant: 0.6396 MPa (Ti)

Max stress resultant: 0.1357 MPa (Bone)

A close up of a logo

Description automatically generated2. Human femur (section 2) and metal bar

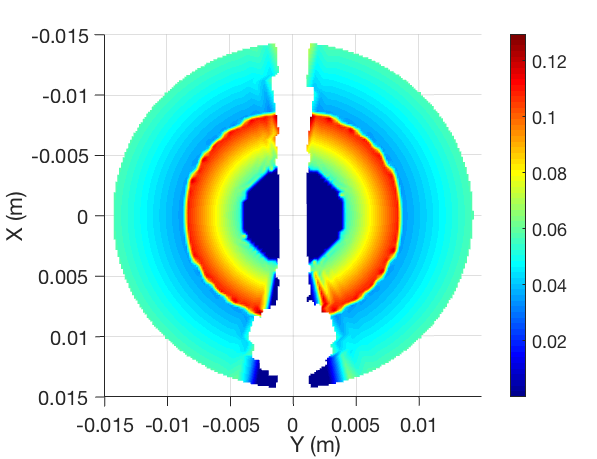
R2

A close up of a logo

Description automatically generated

R1

R0



A close up of a logo

Description automatically generated

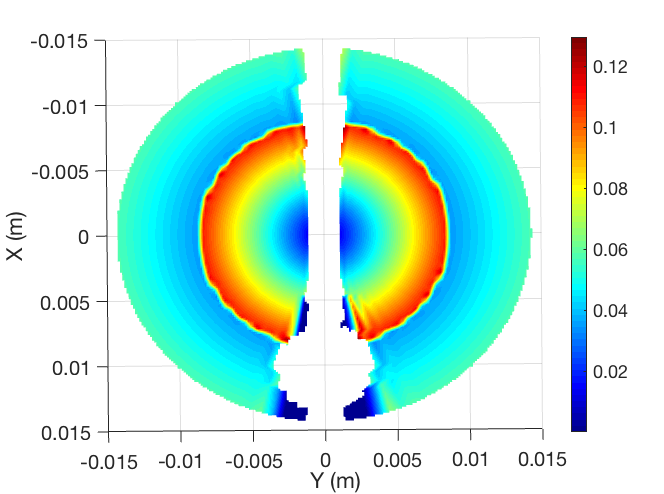
Angle of twist per unit length: 0.0010 rad/m

Torsional rigidity: 538.3641 N.m^2/rad

Total torque: 0.5384 N.m

Max stress resultant: 0.6286 MPa (Ti)

Max stress resultant: 0.1358 MPa (bone)

3. Human femur (section 1) and metal bar: A screenshot of a cell phone

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Description automatically generated

Angle of twist per unit length: 0.0010 rad/m

Torsional rigidity: 543.0140 N.m^2/rad

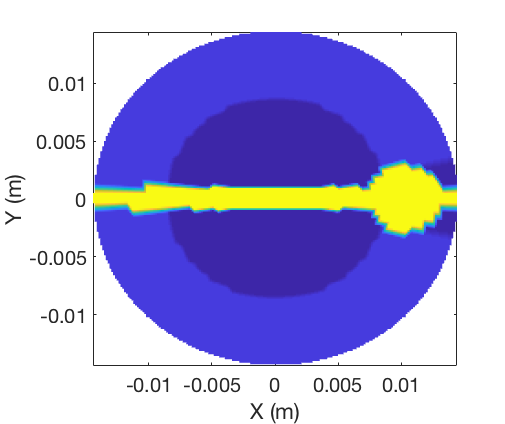
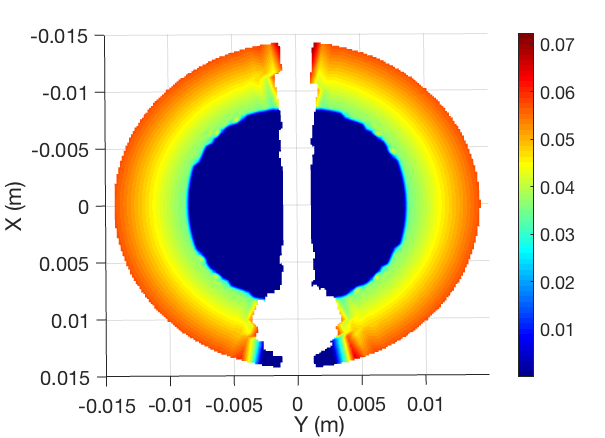
Total torque: 0.5430 N.m

Max stress resultant: 0.6286 MPa (Ti)

Max stress resultant: 0.1358 MPa (bone)

4. Human femur (section 3) and metal bar: A screenshot of a cell phone

Description automatically generated



Angle of twist per unit length: 0.0010 rad/m

Torsional rigidity: 441.6484 N.m^2/rad

Total torque: 0.4416 N.m

Max stress resultant: 0.6286 MPa (Ti)

Max stress resultant: 0.0744 MPa (bone)