

Constitutive Model for Cortical Bone Material.

Introduction

The aim of this work is to study and implement a constitutive model for cortical bone, having as main features orthotropic elasticity, viscoplasticity and damage, and developed in small deformations. The implementation is carried out both in MATLAB and in FORTRAN and is then embedded in a UMAT subroutine to allow its use in FEM simulations carried out with Abaqus commercial software.

Some tests will be performed to check the dependence of the model on some relevant constitutive parameters (viscosity, damage, yield) and to verify its behavior within a FEM code.

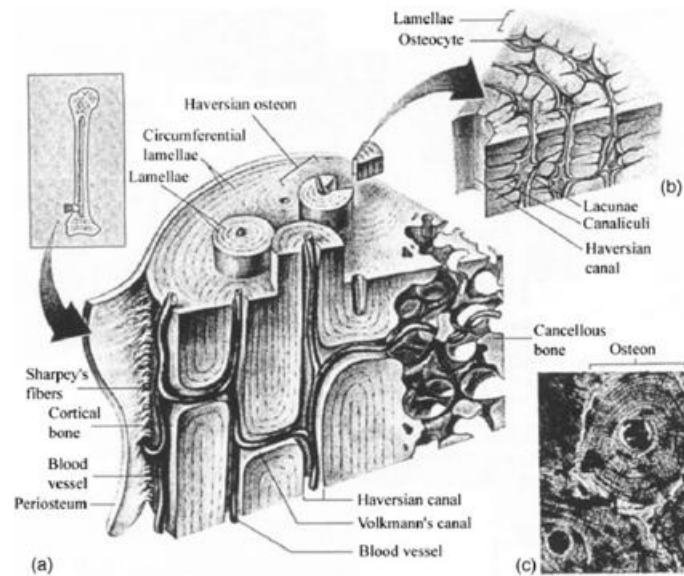


Figure 1.2: Microscopical structure of cortical bone. (a) sketch of cortical bone; (b) cut of Haversian system; (c) photomicrograph of a Haversian system (figure from [Garcia \(2012\)](#))



Requirements

Basic knowledge of FEM simulations.