

## Ex-vivo Experimentation Analysis

### A. Computation of Parameters

Parameters were computed for four bone samples across four zones, with measurements taken from one slice every 9 micrometers. The choice of the cut-off frequency in the filtration of the profile is done on one slice of the bone and reported to all the bones

#### *Additional Considerations:*

- The cut-off frequency can be computed for each slice where we compute the parameters for more accuracy.
- The parameters can be computed on the averaged image.
- Discussion about the method chosen to compute the parameters.

### B. Specularity Computation

#### Choice of Region of Interest

The endosteum segmentation was performed on the specular beamformed images. This segmentation inherently depends on the degraded state of the bone and the ability to detect the endosteum. Some portions of the endosteum were not detected and thus were not included in the results.

*Additional Considerations:* Segmentation could also be performed using micro-CT images for more precise results.

A parabola was fitted to the segmented endosteum and extended by a 2-lambda length. Various lengths were tested to evaluate their impact on the results.

#### Analysis Metrics

The mean specular index was computed for the region of interest. However, due to the presence of pixels with low specular values, the mean value alone did not effectively differentiate between degraded and smooth bone interfaces, with differences in the specular index being less than 0.1. Therefore, we also calculated the percentage of specular pixels in the region. This percentage represents the proportion of pixels with values above the specular threshold of 0.4. The threshold value was determined by examining a well-detected endosteum, such as in the case of sample 227G, and selecting the value at which there was no change in the detected specular interface.

*Additional Considerations:* Other metrics, such as the standard deviation, could be studied.

- Why does the increase in the correlation length lead to a decrease in the specular index in ex-vivo measurement while it has an inverse relationship in simulations?