Article title: Validation of distal radius failure load predictions by homogenized- and micro- Finite Element analyses based on second generation high resolution peripheral quantitative CT images.

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Electronic Supplementary Material 1: Convergence study

A convergence study was executed for the 22 20-mm segments in which the element size was varied from 1.0 to 0.29 elements/mm (corresponding to an element size of 1.0mm to 3.4mm). It was found that at 0.6 elements/mm (1.7 mm element size) both the stiffness and the failure load were within 5% of the value obtained when using 1 element/mm (Fig. A1). At 0.6 elements/mm stiffness values were largely converged, but failure loads were not. The latter likely relates to the fact that no non-local formulation of the failure criterion was used. However, as the localization scale for trabecular bone would be in the range of the intertrabecular distance (1-2 mm), setting the element size to a similar value would render similar results as a non-local implementation. As the cpu-time exponentially increased with reduced element size, such that solving models with 0.6 elements/mm would solve roughly 100 times faster than those with 1 element/mm and as cpu-time was an important factor for the present study, it was concluded that 0.6 elements/mm (1.7 mm element size) would be preferable.

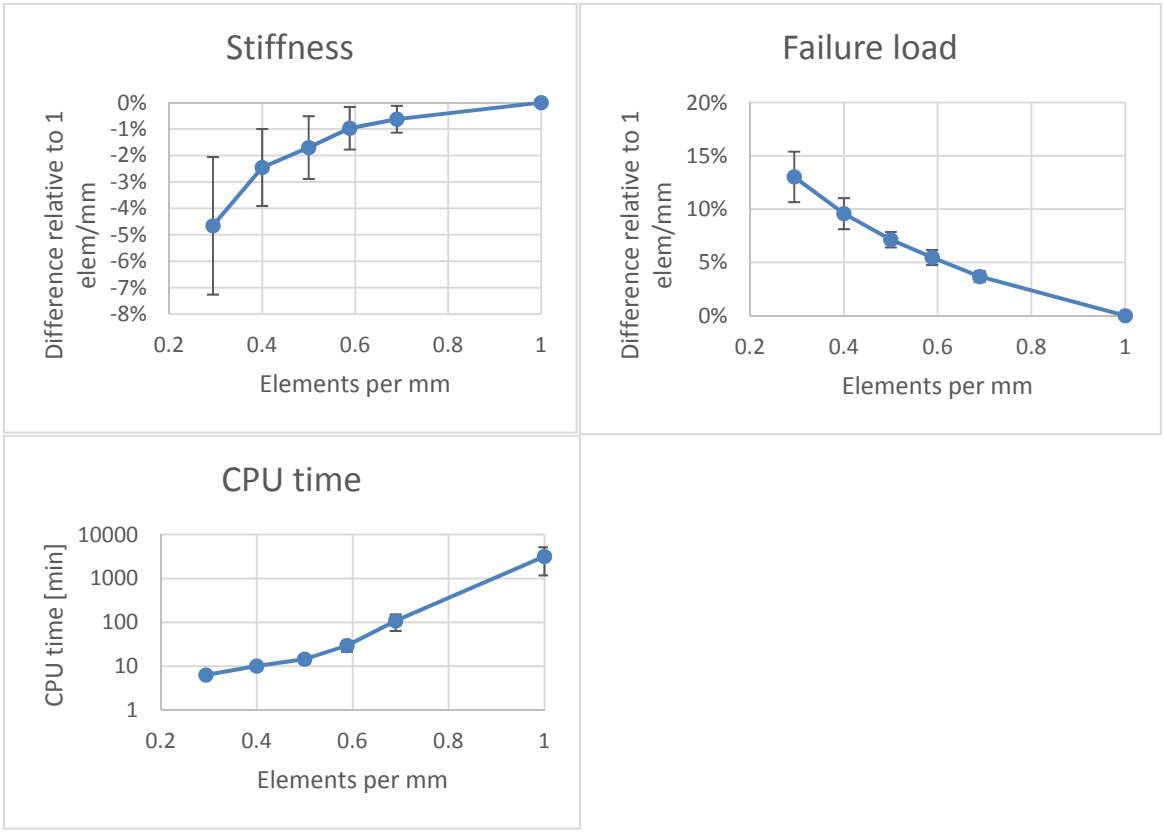

Fig. 1 Effect of element size on the calculated stiffness (top-left) and failure load (top-right) and on the cpu-time needed for the full analysis (bottom). Error bars indicate the 95% confidence intervals.