

Supplementary material for Wikström K, et al. A comparison of patient position displacements from body surface laser scanning and cone beam CT bone registrations for radiotherapy of pelvic targets. Acta Oncol 2013;53:268–277.

Supplementary Appendix

Assuming the combined distribution of deviation vectors with components $\Delta = \{\Delta_{\text{lat}}, \Delta_{\text{long}}, \Delta_{\text{vert}}\}$ along the lateral, longitudinal and vertical directions to be approximated by a 3D multinormal distribution, its probability density function (pdf) was estimated through

$$\text{pdf}(\Delta) = \frac{1}{(2\pi)^{3/2} \times [\det(\Sigma)]^{1/2}} \times \exp \left[-\frac{1}{2} \times (\Delta - \bar{\Delta}) \Sigma^{-1} (\Delta - \bar{\Delta})^* \right] \quad (5)$$

where $\bar{\Delta} = \{\bar{\Delta}_{\text{lat}}, \bar{\Delta}_{\text{long}}, \bar{\Delta}_{\text{vert}}\}$ represents the mean value of all Δ_i , the symbol “*” denotes matrix transpose, and the covariance matrix Σ estimated from using

$$\Sigma = \begin{pmatrix} c_{\text{lat,lat}} & c_{\text{lat,long}} & c_{\text{lat,vert}} \\ c_{\text{lat,long}} & c_{\text{long,long}} & c_{\text{long,vert}} \\ c_{\text{lat,vert}} & c_{\text{long,vert}} & c_{\text{vert,vert}} \end{pmatrix} = \frac{1}{n-1} \sum_{i=1}^n (\Delta_i - \bar{\Delta})(\Delta_i - \bar{\Delta})^* \quad (6)$$

where n is the total number of analyzed displacements.