Supplementary Material

Using (θ, φ) to denote inclination, and azimuth, respectively, the θ and φ of these lines can be given as follows:

$$\begin{cases} \theta \in \{45^{\circ}, -45^{\circ}\} \\ \varphi = n * 18^{\circ},\ n \in \{1, \ldots, 20\} \end{cases} \quad (3)$$

Radial projection was used to find corresponding prostate surface points at these directions.

To get a total of surface points of 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, we selected one surface point every 72°, 36°, 24°, 18°, 14.4°, 12°, 10.3°, 9°, 8°, 7.2° by changing the angle interval in equation 3. TREs were calculated and plotted against the number of surface points used. As shown in the following figure, when n > 40, more surface points will only result in marginal benefits. Thus, we empirically chose 40 surface points.