
# Population model of bladder motion and deformation based on dominant eigenmodes and mixed-effects models in prostate cancer radiotherapy

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**Highlights**

- We propose a population model to estimate the probability of the bladder presence on a given region during treatment using only the planning CT scan as input information.
- We train a motion/deformation model, based on longitudinal data, to predict bladder motion and deformation between fractions.
- We propose a longitudinal analysis using mixed-effect models to separate intra- and inter-patient variability in order to control confounding.
- We reduce, in a factor of 10, the number of variables required to represent bladder surface using spherical harmonics (SPHARM).