Fully-automated treatment field verification is one of the challenging topics in radiation therapy. In this study, an automated portal verification system for anterior-posterior pelvic treatment fields is developed to inspect the patient setup. Initially, the field edges are extracted using an adaptive threshold algorithm and verified using an elliptic Fourier transform method which can detect a distortion as small as 2.5%. A double-snake technique is developed to automatically extract the pelvic brim. This technique guarantees that the snakes robustly converge to a smooth continuous edge. Morphological operators are designed to detect the ilio-pectineal lines in the noisy region under the pelvic brim and inside the field edge. The anatomical landmarks are verified using a Chamfer matching algorithm. The validity of the patient positioning is determined from the difference between the two transformations generated from two stages of verification: the field edge and the anatomical landmarks. An experiment with artificially performed transformations was conducted to examine the robustness of these feature-extraction methods. It shows that the maximum and average translation errors caused from the location variation of anatomical features are 0.76 and 0.41 pixels, and the corresponding maximum and average rotation errors are 0.91° and 0.43°. 54 pelvic electronic portal images were verified using this system. The average patient positioning errors in *x*-translation, *y*-translation and rotation are 2.67, 2.39 pixels, and 0.59°, respectively. Preliminary tests of clinical data indicate that this system can potentially be used in real-time pelvic treatment field verification. This research is partially supported by the Whitaker Foundation.