We propose a system of optimal data estimation partial differential equations and instantaneous coefficient of variation (ICOV) flow active contour model to solve the problem of simultaneously segmenting and despeckling ultrasonic imagery. In particular, we set a deformable contour define the boundary of the prostate in an US image where we model the data via piecewise smooth functions and employ an ICOV flow to evolve the contour. The resulting active contour model offers a tractable implementation to simultaneously segment and smoothly reconstruct the data within a given image in a coupled way. Each step involves an optimal estimation problem for the data within each region bordered by the active contour. The proposed method is intended for automated segmentation of the prostate from trans-abdominal ultrasound images and is currently being tested on a data base composing 27 quasi-axial transabdominal images from six patients. We have collected manual outlines of multiple experienced sonographers as ground truth against which the automated prostate delineation can be evaluated.