



Fig. 4.8: **Spatial smoothness, multi-modal posteriors and testing uncertainty.** Four more regression experiments. The squares indicate labelled training data. The green curve is the estimated conditional mean  $\bar{y}(x) = E[y|x] = \int y \cdot p(y|x) dy$  and the grey curve the estimated mode  $\hat{y}(x) = \arg \max_y p(y|x)$ . Note the smooth interpolating behaviour of the mean over large gaps and increased uncertainty away from training data. The forest is capable of capturing multi-modal behaviour in the gaps. See text for details.

Gaussian Processes on a few representative examples.<sup>2</sup>

In figure 4.9 we compare the two regression models on three different training sets. In the first experiment the training data points are simply organized along a line segment. In the other two experiments the training data is a little more complex with large gaps. We wish to investigate the nature of the interpolation and its confidence in those gaps. The  $2 \times 3$  table of images show posteriors corresponding to the 3 different training sets (columns) and 2 models (rows).

<sup>2</sup>The Gaussian process results in this section were obtained with the “Gaussian Process Regression and Classification Toolbox version 3.1”, publically available at <http://www.gaussianprocess.org/gpml/code/matlab/doc>.