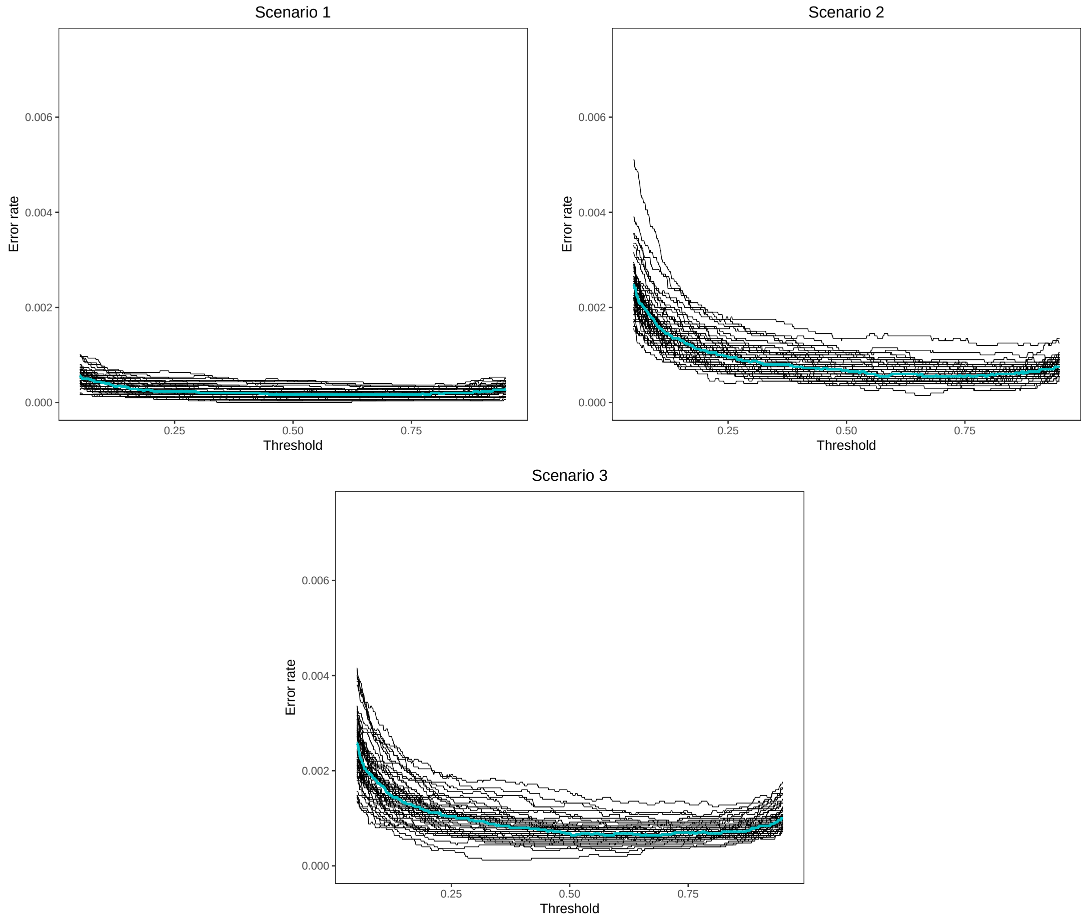

FIGURE 3.2: Misclassification error rate of the fCAM obtained for different values of the threshold $\kappa \in [0.5, 0.95]$ over the 50 replications (black lines) of the simulation study. The colored lines represent the median error rate.

Here and henceforth, we identified the presence of a spike if the posterior probability of a spike at time t, say PPS_t, estimated by the proportion of non-zero A_t's over all MCMC iterations, was greater than a threshold κ. This threshold allows us to control the (estimated) Bayesian false discovery rate at the pre-set value 0.05, that is κ solves the equation

$$\mathrm{FDR}\,(\kappa) = \frac{\sum_{t=1}^{T} (1 - \mathrm{PPS}_t)\, I_{(\mathrm{PPS}_t > \kappa)}}{\sum_{t=1}^{T} I_{(\mathrm{PPS}_t > \kappa)}} = 0.05.$$

For more details, we refer to Newton et al. (2004) and Müller et al. (2007). See also Sun et al. (2015) for a discussion with dependent hypotheses. Moreover, we assessed the sensitivity of spike detection to different values of κ: Figure 3.2 shows the misclassification error rate obtained by varying the threshold between 5% and 95% on the three simulated scenarios. These plots highlight how spike detection for the fCAM is quite robust: indeed, the error rate remains almost stable for several values of the threshold κ.

However, the proposed fCAM not only enables the detection of spikes but also allows