Local limit theorems for Markov chains weakly converging to diffusions.

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We consider a triangular array of Markov chains weakly converging to a diffusion process. For this scheme Konakov and Mammen introduced a parametrix method in 2000. This method was used to obtain new local limit theorems for the transition densities. The class of Markov chains was relatively large but not enough to consider some important discretization schemes such as, for example, the Milstein scheme. We show how generalize this approach to cover many important cases including the Milstein scheme, higher order stochastic Taylor expansion schemes and many other schemes.