PSEUDO-MARTINGALES

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Abstract: For a probability space $(\Omega, \mathcal{F}, P)$ and a filtration $(\mathfrak{U}_n)$ in Q, we consider the sequences (X_n) of random variables satisfying the condition

$$E(X_{n+1} - X_n | \mathfrak{U}_n) = 0, \quad n = 1, 2, \dots$$

In general, the process (X_n) is not required to be $(\mathfrak{U}_n)$ adapted and it is called a *pseudo-martingale*. We indicate simple and natural conditions implying a good asymptotic behaviour of pseudo-martingales. For example: let $(X_n, \mathfrak{U}_n)$ be a uniformly integrable pseudo-martingale with $\mathfrak{U}_n \nearrow \mathcal{F}$. Then $X_n \to X$ weakly in L_1 where

$$X = \lim_{n \to \infty} E(X_n | \mathfrak{U}_n).$$

Some approximation results for σ-fields are obtained with implications to pseudo-martingales. A number of examples is collected.

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