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ON BOUNDEDNESS AND CONVERGENCE OF SOME BANACH SPACE VALUED RANDOM SERIES

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Abstract: Let (f_i) and (g_i) be sequences of independent symmetric random variables and (x_i) a sequence of elements from a Banach space. We prove that under certain assumptions the a.s. boundedness of the scries $\sum x_i f_i$ implies the a.s. convergence of $\sum x_i g_i$ in every Banach space.

If f_i are identically distributed, $E|f_i|$ is finite, g_i are identically distributed and non-degenerate, then the above implication fails in c_0.

If f_i are equidistributed and there is a sequence (a_n) such that

$$a_R^{-1} \sum_{i=1}^{u} |f_i| \to 1 \text{ in probability,}$$

then there is a sequence (x_i) in c_0 such that $\sum x_i f_i$ is a.s. bounded, but does not converge a.s.

In particular, if f_i are p-stable with $Ee^{itf_n} = e^{-|t|^p}$, then for $p < 1$ the a.s. boundedness of the series implies its a.s. convergence, but for $p \geq 1$ it fails.

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