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Beyond partitions of unity

The tried and true method of uniformly approximating continuous functions by smooth functions on Banach spaces is through the use of smooth partitions of unity. Much effort over the last several decades has gone into establishing the existence of such smooth partitions of unity on ever wider classes of non-separable Banach spaces. One weakness of this technique is that it is difficult to arrange for the approximating function to have stronger properties in addition to C^p-Fréchet smoothness.

In this talk we shall first review the method of approximation via partitions of unity, and then discuss more recent approaches in which the smooth approximating function can be chosen also to be Lipschitz or possess a uniformly continuous derivative.