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Gord Sinnamon* (sinnamon@uwo.ca), Department of Mathematics, University of Western Ontario, London, Ontario N5X 2K2, Canada. *Function spaces generated by monotone envelopes.*

The least non-increasing majorant f^\downarrow of $f : (0, \infty) \rightarrow [0, \infty]$ is an example of a monotone envelope. This envelope is taken with respect to the standard partial order on non-negative functions. With respect to the weaker partial order, $\int_0^x f \leq \int_0^x g$, the least non-increasing majorant is the level function f° .

In addition to the pointwise description, these envelopes can be given a functional description that facilitates their use in function spaces. Some past applications include work on Hardy inequalities, duals of Lorentz spaces, and Fourier inequalities in Lorentz spaces.

These envelopes are shown to arise naturally as derivatives of the Peetre K -functional between appropriate spaces. The functional descriptions of f^\downarrow and f° enable the proof of very strong interpolation properties for these spaces.

An important feature of the theory is that the results extend to spaces of functions measurable with respect to a general σ -finite measure on \mathbb{R} . In particular, sequence spaces and weighted function spaces are included. (Received November 28, 2005)