INFINITESIMAL FOURIER TRANSFORMATION FOR
THE SPACE OF FUNCTIONALS

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Topic #4: Nonstandard Methods in Functional Analysis.

[Joint work with and Tomoko Okada.\textsuperscript{1}]

A functional is a function from the space of functions to a number field, for example, \( f : \{ a : (-\infty, \infty) \to (-\infty, \infty) \} \to (-\infty, \infty) \). These three \( \infty \)'s are written as the same notation, but these original meanings are quite different. The purpose of this proceeding is to formulate a Fourier transformation for the space of functionals, as an infinitesimal meaning. For it we divide three \( \infty \)'s to three types of infinities. We extend \( \mathbb{R} \) to \( \star(\star\mathbb{R}) \) under the base of nonstandard methods for the construction. The domain of a functional is the set of all internal functions from a \( \ast \)-finite lattice to a \( \ast \)-finite lattice with a double meaning. Considering a \( \ast \)-finite lattice with a double meaning, we find how to treat the domain for a functional in our theory of Fourier transformation, and calculate two typical examples.

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