Modal Definability in Enriched Languages

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Abstract The paper deals with polymodal languages combined with standard semantics defined by means of some conditions on the frames. So a notion of "polymodal base" arises which provides various enrichments of the classical modal language. One of these enrichments, viz. the base $\mathcal{L}(R,-R)$, with modalities over a relation and over its complement, is the paper's main paradigm. The modal definability (in the spirit of van Benthem's correspondence theory) of arbitrary and Δ-elementary classes of frames in this base and in some of its extensions, e.g., $\mathcal{L}(R,-R,R^{-1},-R^{-1})$, $\mathcal{L}(R,-R,\neq)$ etc., is described, and numerous examples of conditions definable there, as well as undefinable ones, are adduced.

Introduction Undoubtedly, first-order languages are reliable and universal tools for formalization. However, in some cases the cost of this universality is not fully acceptable: on the one hand we have the undecidability results, and on the other the fact that the expressive power of first-order languages does not allow any possibility for a categorical characterization of a given infinite model since it is elementarily equivalent to any of its ultrapower. So it is desirable, sometimes even necessary, to seek alternative languages for particular types of