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THESIS ABSTRACTS

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Kristina Brantley, ***Monadic Intuitionistic and Modal Logics Admitting Provability Interpretations***, New Mexico State University, USA, 2019. Supervised by Guram Bezhanishvili. MSC: O3B45, 03B55, 03F45. Keywords: modal logic, intuitionistic modal logic, monadic modal logic, Gödel translation, Solovay's theorem.

Abstract

The Gödel translation T provides an embedding of the intuitionistic logic IPC into the modal logic Grz, which then embeds into the modal logic GL via the splitting translation S. Combined with Solovay's theorem that GL is the modal logic of the provability predicate of Peano Arithmetic PA, both IPC and Grz have arithmetical interpretations. When attempting to 'lift' these results to the monadic extensions MIPC, MGrz, and MGL of these logics, the same techniques no longer work. Following a conjecture made by Esakia, we add an appropriate version of Casari's formula to these monadic extensions (denoted by a '$+$'), obtaining that the Gödel translation T embeds $\mathsf{M}^+\mathsf{IPC}$ into $\mathsf{M}^+\mathsf{Grz}$ and the splitting translation S embeds $\mathsf{M}^+\mathsf{Grz}$ into MGL. As proven by Japaridze, Solovay's result extends to the monadic system MGL, which leads us to an arithmetical interpretation of both $\mathsf{M}^+\mathsf{IPC}$ and $\mathsf{M}^+\mathsf{Grz}$.

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Rosario Mennuni, ***Invariant Types in Model Theory***, The University of Leeds, UK, 2020. Supervised by Dugald Macpherson and Vincenzo Mantova. MSC: 03C45 (primary), 03C64, 03C65. Keywords: domination, model theory, neostability theory, invariant types, small-type semi-isolation.

Abstract

To a saturated first-order structure $\mathfrak{U}$ it is possible to associate the semigroup $(S^{\mathrm{inv}}(\mathfrak{U}), \otimes)$ of global invariant types. This can be endowed with the *domination* preorder, the semi-isolation analogue of Shelah's $\mathrm{F}^{\mathrm{s}}_{\kappa}$-isolation: $p \geq_{\mathrm{D}} q$ holds iff p together with a small set of formulas entails q. Its kernel $\sim_{\mathrm{D}}$ is called *domination-equivalence*, and this dissertation studies the quotient $S^{\mathrm{inv}}(\mathfrak{U})/\sim_{\mathrm{D}}$. We give sufficient conditions for $\otimes$ to induce a well-defined operation on it, yielding the *domination monoid* $\widetilde{\mathrm{Inv}}(\mathfrak{U})$, develop the general theory of the latter, provide tools to compute it, and do so in various cases of interest.

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