6th International Conference on Applied Informatics Eger, Hungary, January 27–31, 2004.

Direct refutation for the ω -categoricity of the first-order theory of a spacetime-geometrical structure

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Abstract

Let us consider the structure $(\mathbf{Q}^3, <)$ where \mathbf{Q}^3 denotes the set of all triples of rational numbers and $(x_0, x_1, x_2) < (y_0, y_1, y_2)$ is defined as $(x_0 - y_0)^2 > (x_1 - y_1)^2 + (x_2 - y_2)^2 \land x_0 < y_0$. These structure arises in the mathematical logical modelling of the causal theory of the special relativistic space-time (assuming the speed of light to 1). It was proved in [1] that a firstorder temporal theory over this structure is not recursively axiomatizable. Utilizing a result in [2] that says all the first-order temporal theories are recursively axiomatizable over an ω -categorical structure, we noted in [1] that the first-order theory of the structure ($\mathbf{Q}^3, <$) is not ω -categorical. In our talk we directly prove the ω -noncategoricity of our structure.

References

- S. Vályi: First-order spatio-temporal logic over the rationals is non-aximatizable, Logic Colloquium of European Summer Meeting of the Association of Symbolic Logic (ASL), 2001, Vienna
- [2] S. Vályi: Axiomatizability of first-order temporal logics, CSCS'2000, Szeged