▶ IRIS VAN DER GIESSEN, RAHELEH JALALI, AND ROMAN KUZNETS, *Proving uniform interpolation via multicomponent sequent calculi.*
University of Birmingham, University Rd W, Birmingham B15 2TT, United Kingdom.
E-mail: `i.vandergiessen@bham.ac.uk`.
Utrecht University, Janskerkhof 13, 3512 BL Utrecht, Netherlands.
E-mail: `rahele.jalali@gmail.com`.
TU Wien, Treitlstrasse 1-3, A-1040 Vienna, Austria.
E-mail: `roman@logic.at`.

Interpolation is one of the basic logical properties. Craig interpolation states that if $A \rightarrow B$ is valid, then there is an interpolant C with shared variables from A and B such that $A \rightarrow C$ and $C \rightarrow B$ hold. Uniform interpolation is stronger where the interpolant only depends on either A or B.

Proof-theoretic approaches to interpolation are key methods to construct interpolants. Cut-free sequent calculi are used for Craig interpolation and terminating sequent systems for uniform interpolation, i.e., [3]. For Craig interpolation, the proof-theoretic approach was extended to multicomponent sequents, such as hypersequents [4].

We provide new proofs of uniform interpolation in modal logic (see overview [1]), based on multicomponent sequents. The interpolants are defined proof-theoretically, but we use semantic bisimulation quantifiers to prove their correctness. We use terminating nested sequent calculi for logics K, T and D [2]. Recently, we introduced layered sequents for $K5, KD5, K45, KD45, KB45$ and $S5$ (coinciding with hypersequents for $S5$) and provide the first proof-theoretic proof of uniform interpolation for these logics.

[1] MARTA BÍLKOVÁ, *Interpolation in Modal Logics*, Ph.D. thesis, UK Praha, 2006.

[2] IRIS VAN DER GIESSEN, RAHELEH JALALI AND ROMAN KUZNETS, *Uniform interpolation via nested sequents*, **WoLLIC 2021: Logic, Language, Information, and Computation**, (Alexandra Silva, Renata Wassermann and Ruy de Queiroz, editors), vol. 13038, Springer, 2021, pp. 337–354.

[3] TAISHI KURAHASHI, *Uniform Lyndon interpolation property in propositional modal logics*, **Archive for Mathematical Logic**, vol. 59 (2020), no. 5-6, pp. 659–678.

[4] ROMAN KUZNETS, *Multicomponent proof-theoretic method for proving interpolation properties*, **Annals of Pure and Applied Logic**, vol. 169 (2018), no. 12, pp. 1369–1418.