Pich and Santhanam [1] define a generalization of the feasible interpolation property for a propositional proof system P as follows: P has KPT interpolation if there is a constant k and polynomial time computable functions $f_1, \ldots f_k$, such that whenever π is a P-proof of a disjunction

$$A_1(x, y_1) \vee \ldots \vee A_m(x, y_m)$$

where x is an n-tuple of variables and the y_j are disjoint tuples of variables, then for every $a \in \{0,1\}^n$ one of the following holds:

- either $A_{i_1}(a, y_{i_1})$ is a tautology for $i_1 = f_1(a, \pi)$,
- or $A_{i_2}(a, y_{i_2})$ is a tautology for $i_2 = f_2(a, \pi, b_{i_1})$, for b_{i_1} such that $A_{i_1}(a, b_{i_1})$ is false,
- $\cdots$
- or $A_{i_k}(a, y_{i_k})$ is a tautology for $i_2 = f_2(a, \pi, b_{i_1}, \ldots, b_{i_{k-1}})$, for $b_{i_{k-1}}$ such that $A_{i_{k-1}}(a, b_{i_{k-1}})$ is false.

The paper under review shows that sufficiently strong propositional proof systems do not have KPT interpolation, under a mild complexity assumption. The complexity assumption and the method of proof are similar to those used to show that strong proof systems do not have feasible interpolation.

References

[1] J. Pich and R. Santhanam. Strong co-nondeterministic lower bounds for NP cannot be proved feasibly. In S. Khuller and V. V. Williams, editors, *STOC '21: 53rd Annual ACM SIGACT Symposium on Theory of Computing*, pages 223–233. ACM, 2021.