Prague strategies

LIBOR BARTO
Department of Algebra, Charles University, PRAGUE
libor.barto@gmail.com

I will introduce the concept of Prague strategy and discuss the following result and its corollaries.

Theorem [LB and Marcin Kozik]**.** Let **A** be a finite idempotent algebra. The following are equivalent:

(i) **A** lies in a congruence meet semi-distributive variety (equivalently, **A** lies in a variety omitting types **1** and **2**).
(ii) Every Prague strategy over **A** has a solution.

As a consequence we obtain affirmative answers to the conjectures of B. Larose, L. Zádori and A. Bulatov about constraint satisfaction problems (CSPs) solvable by local methods. (For experts in CSP: the theorem also provides optimal parameters for bounded width and relational width.)

I will introduce CSPs and state these conjectures in my talk, here I mention a special case – a conjecture of M. Valeriote.

Two nonempty subalgebras R, S of $\mathbf{A}^n$ are said to be *k-equal*, if for every subset I of $\{1, 2, \ldots, n\}$ of size at most k, the projection of R and S onto the coordinates I are equal. We say that an algebra **A** has the *k-intersection property* if for every n and every collection $R_1, \ldots, R_m$ of pairwise k-equal subalgebras of $\mathbf{A}^n$, the intersection of R_1, …, R_m is nonempty. M. Valeriote proved that if a finite idempotent algebra **A** has the k-intersection property for some k, then **A** lies in a congruence meet semi-distributive variety, and he conjectured the converse. Our theorem provides an affirmative answer with optimal $k = 2$.