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Counterexample to Conjectures of Bonato-Tardif, Thomassé and Tyomkyn

Two structures R and S are equimorphic when each embeds in the other; we may also say that one is a sibling of the other. Generally, it is not the case that equimorphic structures are necessarily isomorphic: the rational numbers, considered as a linear order, has up to isomorphism continuum many siblings. Let $Sib(R)$ be the number of isomorphism classes of siblings of R. Thomassé conjectured that for each countable relational structure R, $Sib(R) = 1$, $\aleph_0$ or $2^{\aleph_0}$. There is an alternative case of interest, whether $Sib(R) = 1$ or infinite for a relational structure R of any cardinality. The alternate Thomassé conjecture is connected to the Bonato-Tardif conjecture asserting that the sibling number of a tree is one or infinite. Further, Tyomkyn conjectured that if a locally finite tree has a non-surjective self-embedding, then it has infinitely many siblings, unless the tree is a ray. All the conjectures mentioned were verified for some structures such as chains, rayless trees, rooted trees, rayless graphs, cographs, countable NE-free posets, etc. This talk will introduce some locally finite trees having an arbitrary finite number of siblings, which disproves all conjectures of Bonato-Tardif, Thomassé and Tyomkin.