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Birkhoff's Covariety Theorem without limitations

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Abstract: J. Rutten proved, for accessible endofunctors F of Set , the dual Birkhoff's Variety Theorem: a collection of F -coalgebras is presentable by coequations (= subobjects of cofree coalgebras) iff it is closed under quotients, subcoalgebras, and coproducts. This result is now proved to hold for all endofunctors F of Set provided that coequations are generalized to mean subchains of the cofree-coalgebra chain. For the concept of coequation introduced by H. Porst and the author, which is a subobject of a member of the cofree-coalgebra chain, the analogous result is false, in general. This answers negatively the open problem of A. Kurz and J. Rosický whether every covariety can be presented by equations w.r.t. co-operations. In contrast, in the category of classes Birkhoff's Covariety Theorem is proved to hold for all endofunctors (using Rutten's original concept of coequations).

Keywords: Birkhoff's Theorem, covariety, coequation

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