

Nelson Martins-Ferreira*
Instituto Politécnico de Leiria

On the coincidence of internal categories and internal groupoids

We study the difference between internal categories and internal groupoids in terms of generalised Mal'tsev properties—the weak Mal'tsev property on the one hand, and n -permutability on the other. We give conditions on internal categorical structures which detect whether the surrounding category is naturally Mal'tsev, Mal'tsev or weakly Mal'tsev. We show that these do not depend on the existence of binary products. In the second part we prove that, in a weakly Mal'tsev context, categories and groupoids coincide precisely when every relation which is reflexive and transitive is also symmetric. In varieties of algebras this latter condition is known to be equivalent to n -permutability. Moreover, in the regular context this last condition (n -permutability) is sufficient to guarantee the coincidence of groupoids and internal categories.

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