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Algebraic representation theory of partial algebras

Let $(\mathcal{A},\ \Gamma,\ \circ)$ be a *partial algebra*, i. e. $\mathcal{A}$ is a linear space, $\Gamma \subseteq \mathcal{A} \times \mathcal{A}$ is a relation on $\mathcal{A}$ and $\circ$ is a partial multiplication on $\mathcal{A}$ such that

(i) $(x, y) \in \Gamma \Longleftrightarrow x \circ y \in \mathcal{A}$

(ii) $(x, z) \in \Gamma$ and $(y, z) \in \Gamma$ imply $(\alpha x + \beta y, z) \in \Gamma$, and then $(\alpha x + \beta y) \circ z = \alpha(x \circ z) + \beta(y \circ z)$ for all $\alpha, \beta \in \mathbb{C}$, the complex plane.

This paper develops the *algebraic representation theory* for partial algebras. We introduce the notion of *irreducibility* for representations of a partial algebra, prove necessary and sufficient conditions for a representation to be (a) *irreducible* or (b) *completely reducible*, and develop aspects of the *decomposition theory* of completely reducible representations.