

Nonassociative products in nonassociative algebras with involution

Starting from the variety of associative, Lie, Jordan, or alternative algebras with involution (or involutive automorphism), we classify all the formal bilinear products of the form

$$axy + bx^*y + cxy^* + dx^*y^* + Ayx + Byx^* + Cy^*x + Dy^*x^*,$$

formed with the help of the original product and the involution $*$ (resp. involutive automorphism), which are either flexible, power-associative, alternative, associative, Jordan, binary-Lie, Malcev or Lie for all algebras of the chosen variety. To do so we formally define and study the change of product in an algebra acted on by a group of automorphisms and antiautomorphisms, solve the associative variety case via free algebras with computer assistance, and then solve the nonassociative cases via representations, nonassociative PI theory, and specific algebras.