Braces, generalizations and applications to the Yang-Baxter equation

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Braces were introduced by Rump as a generalization of radical rings to study non-degenerate involutive set-theoretic solutions of the Yang-Baxter equation. We generalize Rump's braces to the non-commutative setting and use this new structure to study not necessarily involutive non-degenerate set-theoretical solutions of the Yang-Baxter equation. Based on results of Bachiller and Catino and Rizzo, we develop an algorithm to enumerate and construct classical and skew braces of small size (up to isomorphism). With this algorithm we were able to produce a database of classical and skew braces of small size. We present several open problems and conjectures. See arXiv:1511.03171.

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