

**Title:** Augmented ternary maps, their applications to set-graded arbitrary triple systems, and more applications

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Let  $\mathfrak{A}$  be a non-empty set. An augmented ternary map over  $\mathfrak{A}$  is any map

$$f : \mathfrak{A} \times \mathfrak{A} \times \mathfrak{A} \rightarrow \mathfrak{A} \cup \{\epsilon\}$$

with  $\epsilon \notin \mathfrak{A}$ . We show that any augmented ternary map  $f$  over  $\mathfrak{A}$  induces a decomposition on  $\mathfrak{A}$  as the orthogonal disjoint union of well-described ideals. If  $(\mathfrak{A}, f)$  is furthermore a division  $f$ -triple, it is shown that the above decomposition is through the family of its simple ideals. We apply these results to different ternary structures with gradings, getting structural theorems analogous to the second Wedderburn classical theorem.

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