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A WEAKER NOTION OF ATOMICITY IN INTEGRAL DOMAINS

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Abstract

In classical factorization theory, an integral domain is called atomic if every nonzero nonunit element can be written as a finite product of irreducible elements. Here, we introduce and study a weaker notion of atomicity, which relaxes the requirement that all elements admit a factorization into irreducibles. Namely, we say that an integral domain is sub-atomic if every nonunit divisor of an atomic element is also atomic. We further consider several factorization properties associated with this notion. Then, we investigate the basic properties of such domains, provide examples, and explore the behavior of the sub-atomic property under standard constructions such as localization, polynomial rings, and D + M constructions. Our results highlight the independence of the sub-atomic property from other classical factorization properties and introduce an important class of integral domains that lies between atomic and non-atomic domains.

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