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Second Representation of Modules over Commutative Rings

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Abstract : Let R be a commutative ring. Representation theory studies the representation of R-modules as (possibly finite) sums of special types of R-submodules. Here we are interested in a class of R-modules between the class of semisimple R-modules and the class of R-modules that can be written as (possibly finite) sums of secondary R-submodules (we know that every simple R-submodule is secondary). We investigate R-modules which can be written as (possibly finite) sums of second R-submodules (we call those modules second representable). Moreover, we investigate the class of (main) second attached prime ideals related to a module with such representation. We provide sufficient conditions for an R-module M to get a (minimal) second representation. We also found the collection of second attached prime ideals for some types of second representable R-modules, in particular within the class of injective R-modules. As we know that every simple R-submodule is second and every second R-submodule is secondary, we can see the importance of the second representable R-module.

Keywords : lifting modules, second attached prime ideals, second representations, secondary representations, semisimple modules, second submodules
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