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Review text:

This is an expository paper in which the authors survey results on the concept of a hull of a ring (a module) with respect to a specific class of rings (modules). Roughly speaking a hull is a ring (a module) which is minimal among essential over-rings (essential over-modules) from a specific class of rings (modules).

The general theory of hulls is developed through the investigation of four problems with respect to various classes of rings (the classes of Baer rings, quasi-Baer rings, right extending rings, right FI-extending rings, right continuous rings, right quasi-continuous rings, right principally quasi-Baer or right Rickart):

I Assume that a ring R and a class $\mathcal{R}$ of rings are given.

(i) Determine conditions to ensure the existence of right rings of quotients and that of right essential over-rings of R which are, in some sense, minimal with respect to belonging to the class $\mathcal{R}$.

(ii) Characterize the right rings of quotients and the right essential over-rings of R which are in the class $\mathcal{R}$ possibly by using the minimal ones obtained in part (i).

II Given a ring R and a class $\mathcal{R}$ of rings, determine what information transfers between R and its right essential over-rings in $\mathcal{R}$ (especially the right essential over-rings which are, in same sense, minimal with respect to belonging to $\mathcal{R}$).

III Given two classes of rings $\mathcal{R}$ and $\mathcal{S}$ determine those $T \in \mathcal{R}$ such that $Q(T) \in \mathcal{S}$ (where $Q(T)$ denotes the maximal right quotient ring of R).

IV Given a ring R and a class of rings $\mathcal{R}$, let $X(R)$ denote some standard type of extension of R (e.g., group ring extensions, full and triangular matrix ring extensions, infinite matrix ring extensions, etc.) and let $H(R)$ denote a right essential over-ring of R which is minimal with respect to belonging to the class $\mathcal{R}$ (i.e., a hull). Determine when $H(X(R))$ is comparable to $X(H(R))$.