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The functor Hom and cotorsion theories

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Assume that $(\mathcal{A}, \mathcal{B})$ as well as $(\mathcal{C}, \mathcal{D})$ form cotorsion theories of R -modules where R is an integral domain. Consider $H = \text{Hom}_R(A, B)$. Our main purpose is to get information about conditions about a fixed A (resp. B) when $H \in \mathcal{D}$ for all $B \in \mathcal{B}$ (resp. $H \in \mathcal{D}$ for all $A \in \mathcal{A}$), and when $H \in \mathcal{D}$ for all $A \in \mathcal{A}$ and $B \in \mathcal{B}$.

This is a joint work with László Fuchs.