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Lifting and modules of finite projective dimension (25-30)

Let Λ be an artinian ring and let B be a right projective Λ - Λ -bimodule. Recall that a ring Γ is an extension of Λ by B if we have a short exact sequence of abelian groups $0 \rightarrow B \rightarrow \Gamma \xrightarrow{f} \Lambda \rightarrow 0$ where f is a homomorphism of rings. Recall that a Λ -module M is called liftable to Γ if there exists some Γ -module X such that $X/BX \cong M$ and $\mathrm{Tor}_n^\Gamma(\Lambda, X) = 0$ for all $n > 0$. We show how upper bounds of the finitistic dimension of Γ may be computed using the finitistic dimension of liftable Λ -modules. We give a characterization of Γ -modules of finite projective dimension in the case where Λ is a ring of finite global dimension. We also discuss examples of extensions of Λ when Λ is a finite dimensional algebra of global dimension 2.