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Applications of Non-Reductive Geometric Invariant Theory

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In general geometric invariant theory (GIT) for non-reductive linear algebraic group actions is much less well behaved than for reductive actions. However when the unipotent radical U of a linear algebraic group H is graded, in the sense that a Levi subgroup has a central one-parameter subgroup which acts by conjugation on U with all weights strictly positive, then GIT for a linear action of H on a projective scheme is almost as well behaved as in the reductive setting, provided that we are willing to multiply the linearisation by an appropriate rational character. This has potential applications for the construction of moduli spaces of 'unstable' objects of prescribed type, such as sheaves of fixed Harder–Narasimhan type or unstable curves.

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