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Equivariant completion II

By

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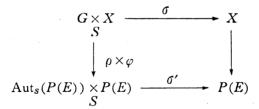
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0. Introduction.

In this paper, we shall generalize the results obtained in [13]. Let S be a scheme and let G be a surjective smooth affine group scheme over S with connected fibres and let X be a normal noetherian S-scheme on which G acts regularly. We shall prove following three results;

a) For any line bundle L on X, there is a positive integer m such that $L^m(=L^{\otimes m})$ is G-linearizable (cf. Theorem 1.6). Moreover, if S is noetherian and if X is normal and quasi-projective over S, then there is a coherent \mathcal{O}_s -Module E (cf. Theorem 2.5) such that

- (1) There is an immersion $\varphi: X \rightarrow P(E)$,
- (2) There is a representation $\rho: G \rightarrow \operatorname{Aut}_{\mathfrak{s}}(P(E))$ and
- (3) The following diagram is commutative.



where $\sigma: G \times X \to X$ is the regular action of G on X and $\sigma': S$ Aut_s $(P(E)) \times P(E) \to P(E)$ is the canonical action of Aut_s(P(E)) on P(E). Therefore, the regular action G on X is linear.

b) If S is normal, noetherian and if X is an S-scheme satisfying the property (N) (cf. Definition 3.5) on which G acts regularly, then X is covered by G-stable open subschemes $(U_t)_{1 \le t \le n}$ which are