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Remarks on Gieseker's degeneration

In 1984, in proving of a conjecture of Newstead-Ramanan, Gieseker introduced a degeneration of moduli spaces of stable rank two vector bundles on curves when the smooth curves degenerate into an irreducible curve X with one node. It is a GIT quotient with only normal crossing singularities. In 1999, Nagaraj and Seshadri constructed a generalized Gieseker's degeneration of moduli spaces of arbitrary rank stable bundles, which is also a GIT quotient with only normal crossing singularities. Recently, Young-Hoon Kiem and Jun Li constructed the normal crossing degeneration as an algebraic space whose normalization is a smooth algebraic space. Then they constructed a sequence of moduli spaces (as algebraic spaces) M^α ($0 < \alpha < 1$) so that when α closed to 1, M^α is the normalization of the degeneration, and when α closed to 0, M^α is a fiber bundle over the moduli space $\mathcal{U}_{\tilde{X}}(r, d)$ of stable bundles on \tilde{X} , where \tilde{X} is the normalization of X . In this talk, we remark firstly that Kiem-Li's degeneration coincides with Nagaraj-Seshadri's degeneration. Thus it is also a GIT quotient. Secondly, the M^α are GIT-quotients for a linearization depending on α .