The geography of slopes of fibrations

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Setting X minimal nonsingular surface of general type. (Chern nubers, Muyaoka-Yau inequality, noether line etc)

Qesetion: for $(m,n) \in D$ is there X such that $c_1^2(X) = m, c_2(X) = n$

In this paper, we show that if $g = 3$, then each rational number $r \in [\lambda_m(g), \lambda_M(g)]$ can occur as the slope of some fibration of genus g. A similar result is also true for $g = 3$ and $r \in [\lambda_m(3), 9]$.

1 main theorem

If $g = 3$, then for each rational number $r \in [\lambda_m(g), \lambda_M(g)]$, there exists a fibration of genus g with slope r.