$\dim|\mathcal{J}_{P_0'}(2)| = \dim|\mathcal{J}_{P_0''}(1)| \geq 3$ which is impossible by $\dim H^0(\mathbb{P}^2, \mathcal{O}(H)) \leq 3$ again. ┘

Now the Reciprocity Formula I was proved for $\mathbb{P}^2$ under the assumption that $C \cdot C' = P_0 + P$ where the 0-cycle $P_0 + P$ consists of distinct points of transverse intersection. It is easy to extend the formula to a general surface, but relaxing the restriction on $P_0 + P$ is more difficult by the previous method, which was to convert the ideal sheaf of P_0 into a locally free one by a blowing up. In practice, it is desirable to have a more general reciprocity formula, and as an application of global duality we shall give this extension.

Suppose that S is a regular algebraic surface — thus $h^{1,0}(S) = h^{2,1}(S) = 0$ — and $L \to S$ is a holom-

┌ Maybe. S is regular means that S is rational. Here are the evidences.

① By P536, & P494

if S is rational, then. $q(S) = h^{1,0}(S) = 0$,

$P_g(S) = h^{2,0}(S) = 0$, & $P_2(S) = h^0(S, \mathcal{O}(K_S^2)) = \dim H^0(S, \Omega^2)$

$= \dim H_{\bar\partial}^{2,0}(S) = h^{2,0}(S) = 0$.

② In the statement above, the authors refer the blowing up. According to P520. Theorem, every rational surface is the blow-up of $\mathbb{P}^2$ or