

A GLANCE ON THE MINIMAL MODEL PROGRAM TOWARDS COUCHER BIRKAR'S CONTRIBUTION

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ABSTRACT. A smooth projective variety X is said to be a minimal model if for any smooth projective variety Z birationally equivalent to X , the induced birational map $Z \dashrightarrow X$ is a morphism. Determining a minimal model in each birationally equivalence class of varieties is a major part of the classification of algebraic varieties, the guiding problem of the subject. The case of algebraic curves is well-settled; for any genus g and any point on the moduli space of curves of genus g , there is a unique minimal model. The case of algebraic surfaces was studied by the Italian school of algebraic geometry in the 19th century which was essentially summarized on the Castelnuovo Contraction Theorem in 1900. Since then no progress was made on the subject until 1982 when S. Mori managed to change Castelnuovo's approach and proved some breaking through results on a minimal model of 3-folds. In recognition of Mori's work, he was awarded a Fields Medal in 1990. Mori's minimal model could have singularities, the so called terminal singularities. The topic has become an extremely active research area in the last 30 years or so as the Minimal Model Program. The minimal model program for 3-folds was successfully completed in 1980's by the work of Kawamata, Kollar, Mori, Shokurov and others. The general case in dimension four was settled by V. V. Shokurov with a short proof by Coucher Birkar. In higher dimensions, the literature is extremely rich with deep developments in different directions. One of the most influential papers is the one by Birkar-Cascini-Hacon-Mc Kernan "Existence of minimal models for varieties of log general type" in 2010.

The aim of this talk is to recall some basic concepts in algebraic geometry in order to state some results on the minimal models of smooth projective varieties to touch Birkar's contributions!