

# Queen's Algebraic Geometry — Seminar —

## THE JACOBIAN IDEAL OF THE BINARY DISCRIMINANT

JAYDEEP CHIPALKATTI  
University of Manitoba

### Abstract

Consider a degree  $d$  binary form  $F = a_0x^d + a_1x^{d-1}y + \dots + a_dy^d$ , where the  $a_i$  are complex numbers. There is a polynomial  $\Delta_F(a_0, \dots, a_d)$  called the discriminant of  $F$  with the following property:  $F$  has a repeated linear factor iff  $\Delta_F = 0$ . Consider its *Jacobian ideal*

$$J = \left( \frac{\partial \Delta_F}{\partial a_0}, \dots, \frac{\partial \Delta_F}{\partial a_d} \right) \subseteq \mathbb{C}[a_0, a_1, \dots, a_d].$$

The group  $SL_2(\mathbb{C})$  acts on binary forms by a change of variables, and everything above is natural with respect to this action. The main result of the talk is that  $J$  is a perfect ideal of codimension two. Its  $SL_2$ -equivariant minimal resolution can be explicitly described; this implies *inter alia* that  $\Delta_F$  satisfies a system of algebraic differential equations with quadratic coefficients. This is joint work with Carlos D'Andrea from University of California, Berkeley.

Monday, March 14, 2005  
2:30pm – 3:30pm  
422 Jeffery Hall