Meromorphic solutions of a third order ODE

Wu Chengfa
Shenzhen University
Email: cfwu@hku.hk

In this talk, we will consider meromorphic solutions of the differential equation

$$Au'(z)^2 + Bu(z)u''(z) = u^{(3)}(z) + \alpha u''(z) + \beta u'(z) + \gamma u(z) + \delta,$$

where $AB \neq 0$ and $A, B, \alpha, \beta, \gamma, \delta \in \mathbb{C}$. This equation includes many differential equations with mathematical or physical backgrounds as special cases, some of which will be introduced, e.g. the Falkner-Skan equation and Chazy's equation.

For generic situation, the classification of all meromrophic solutions will be discussed, after which explicit construction of these solutions will be given. For non-generic situation, the structure of meromorphic solutions may vary a lot (depending on the parameters), which will be illustrated using certain examples.