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Modular Solutions to Modular Differential Equations

In this talk, we investigate the modular differential equation $y'' + F(z)y = 0$ on the upper half-plane , where F is a weight 4 modular form for $\Gamma_0(2)$. Our method involves solving the associated Schwarzian equation $\{h, z\} = 2F(z)$, where $\{h, z\}$ denotes the Schwarzian derivative of a meromorphic function h. We will establish the conditions under which the solutions to this equation are modular functions for subgroups of the modular group, and we provide explicit expressions for these solutions in terms of classical modular functions.