A Galoisian approach to complex oscillation theory

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We demonstrate that complex non-oscillatory solutions (in the sense of Nevanlinna theory) of certain class of Hill equations are among the Liouvillian solutions of associated differential equations. We shall establish a full equivalence between the two viewpoints when the Hill potential is a linear combination of four exponential functions. This equation is closely related to the classical Lame and Mathieu equations. We shall also discuss new orthogonality found for these non-oscillatory solutions.