Abstract

The representation of the Hardy-Lebesgue space $H_2(\Delta)$ by means of shift operators is used, to find necessary and sufficient conditions for the singular differential equation

$$z^m \frac{dy(z)}{dz} + a(z) \cdot y(z) = b(z), \quad m \geq 2, \quad m \in N,$$

to have solution in $H_2(\Delta)$. The coefficients $a(z)$ and $b(z)$ are assumed to be locally analytic functions. The case $m = 2$ recovers known results for corresponding problems with analytic solutions in a neighborhood of zero.