

# Exponential stability of $C_0$ -semigroup in the problem of vibrating string

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## Abstract

We consider a certain type of one-dimensional wave equation with non-constant coefficients. This equation with boundary conditions describes the small vibrations of a string. We focus on a nonhomogeneous string of length one, which is fixed at the one end and damped into another. This problem can be rewritten as an abstract Cauchy problem for the densely defined closed operator  $B$  acting on the appropriate Hilbert space  $H$ . Using the estimations for solutions of Sturm–Liouville equation we show that  $B$  is the generator of the exponentially stable  $C_0$ -semigroup of contractions on  $H$ .

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