

Study of the Technical Condition of the Bridge Structure

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Abstract. The assessment of bridge structures is not only relevant, but also an integral part of effective infrastructure management aimed at ensuring safety, convenience and comfort for citizens. Many bridges have been destroyed due to imperfect design, the use of low-quality materials, and inappropriate construction methods. Consideration of natural and human factors in the design, construction and operation of bridge structures is key to ensuring their safety, durability and long-term performance. Any defects require careful monitoring, assessment and timely repair to ensure the safety and reliability of bridges. Various methods are used to inspect bridge structures. Inspection methods can be used individually or in combination to obtain comprehensive information on the condition of bridge structures and take the necessary measures for their maintenance and repair. In work to determine the stresses in a bridge, we use the finite element method (LIRA 9.4 R3). The inspection of the bridge's structures revealed a number of defects resulting from corrosion processes, operational factors and certain structural deficiencies. To ensure the durability of the bridge structures, it is necessary to reconstruct the bridge.

Introduction

The construction and assessment of bridge safety are critical tasks in the modern world to ensure the safety and reliability of transport infrastructure, save lives and property of citizens, and support sustainable development of society [1, 2]. The risk of defects and damage is associated with the ageing of existing structures, increased traffic and freight flows, changes in climate conditions, and frequent natural disasters (floods, earthquakes, strong winds) [3, 4]. Therefore, it is necessary to regularly assess the condition of bridges to identify potential problem areas and prevent accidents in a timely manner [5, 6].

Main Part

The assessment of bridge structures is not only relevant, but also an integral part of effective infrastructure management aimed at ensuring safety, convenience and comfort for citizens.

Bridge structures are exposed to factors that can be divided into natural and human factors throughout their service life [7, 8].

Changes in climatic conditions (temperature, humidity, etc.) affect the materials of bridge structures and can cause corrosion and other damage [9].

In [10], the movement of the foundation of integral pier bridges due to seasonal temperature fluctuations is modelled. The theory of classical mechanics is used to develop an analytical model for determining the movement of piles due to temperature fluctuations in integral pier bridges. The maximum lateral displacement (contraction) occurs in winter.