

**INSTITUTE OF POLYMER MECHANICS
UNIVERSITY OF LATVIA**

**SEVENTEENTH INTERNATIONAL CONFERENCE
MECHANICS OF COMPOSITE MATERIALS**

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BOOK OF ABSTRACTS

Eds. V. Tamužs, K. Cīrule, and V. Kulakovs

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- Institute of Polymer Mechanics

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- Latvian Council of Science
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- Journal *Mechanics of Composite Materials*
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FOREWORD

Since 1965, with intermissions of two to three years, Riga has been hosting regular conferences on the mechanics of polymer and composite materials organized by the Institute of Polymer Mechanics. The scope of problems covered at these conferences has always been wide, incorporating all the basic aspects of this field of science.

In the best traditions and spirit of the previous fifteen forums, the seventeenth Conference will be discussing a wide spectrum of topics related to the mechanics of composites, including nanocomposites, such as the structure and properties, long-term deformational properties and durability, strength, fracture and fatigue, composite structures, application of composite materials in aeronautics and space, technology (mechanical aspects), and composites in civil engineering and infrastructure.

The present Book of Abstracts comprises 218 abstracts of 477 contributors from 36 countries (Algeria, Azerbaijan, Belarus, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, France, Greece, Germany, Hungary, Iran, India, Israel, Italy, Jordan, Kazakhstan, Korea, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Poland, Portugal, Romania, Russia, Saudi Arabia, Scotland, Spain, Sweden, Turkey, Ukraine, United Kingdom, U.S.A).

The full papers having passed the reviewing procedure and having met the demands of the periodical will be published in the journal *Mekhanika Kompozitnykh Materialov*/Mechanics of Composite Materials issued by the Institute of Polymer Mechanics.

The Organizing Committee expresses thanks to all the contributors of the abstracts and wishes the delegates fruitful participation in the Conference, as well as a pleasant stay in Riga and *Jurmala*.

Organizing Committee

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ASSESSMENT OF THE FATIGUE LIFE OF A TOWER BY USING A REAL-TIME LOADING HISTORY

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High and slender sightseeing towers are subjected not only to a wind caused vibrations but also to a human's caused vibrations. If the natural frequency of the structure is close to the frequency of the human pacing, then human and structure's interaction should be considered in the tower design. The main component of the sightseeing tower is stairs and human movement on them generates significant longitudinal and transverse force components that cause sightseeing tower's torsional and transversal vibrations. Additionally there could be a resonant built up problem that causes increase of the service stress range.

There were experimentally measured vibrations and obtained a real time history of the eccentric, 36 m high steel structure sightseeing tower in Jurmala, Latvia. Figure 1. shows the tower tip movement acceleration path in 20 sec time.

The complex loading history fatigue life assessment usually is performed by using rainflow method when counting an irregular stress – time history. In cases, where is a need for the modal parameter estimation, it would be very convenient to use frequency domain fatigue approach.

There was performed fatigue life assessment using experimental data of the tower's most important connection with both above mentioned approaches and given comparison. It is assessed service life expectancy for the steel double core sightseeing tower in Dzintari.

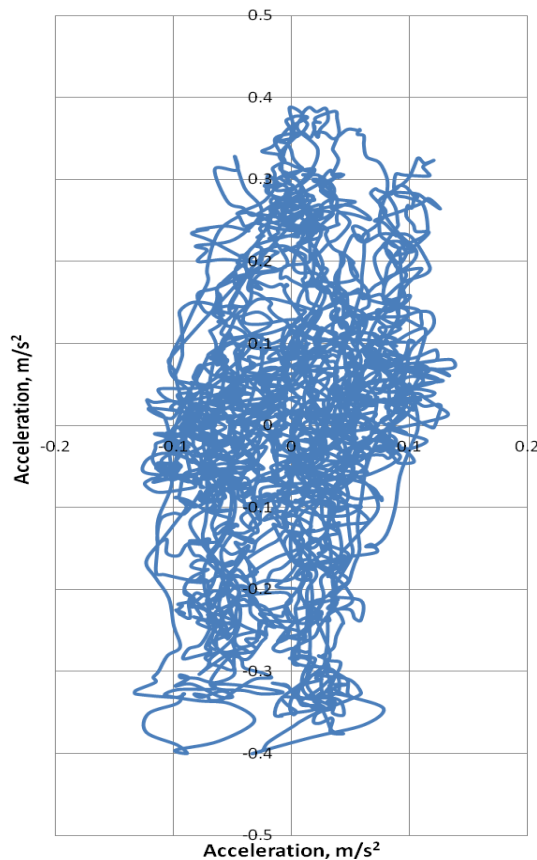


Fig. 1. Tower tip acceleration path in 20sec time.