

ANISOTROPY OF SEISMIC WAVES IN THE UPPERMOST PART OF THE EARTH CRUST

Grant project of the Grant Agency of the Academy of Sciences of the Czech Republic

No B 3046301

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Abstract

This work aims to development of techniques of P and S-waves separation and for anisotropy studies. As a result of short time differences between P and S-waves at small-scale studies the P and S-waves overlap. Two techniques for P and S-waves separations were developed and tested. Part of the project was also research of anisotropy of deeper geological structures from Central European wide-angle seismic profiles CELEBRATION 2000 and SLICE 2003, where new interesting features were found.

KEYWORDS: anisotropy, P- and S-wave separation, CELEBRATION 2000, SLICE 2003

EVALUATION OF THE GEOLOGICAL PHENOMENA THREATENING HISTORICAL HERITAGE STRUCTURES IN THE CZECH REPUBLIC DOMINATING THE LANDSCAPE SCENERY

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No 205/03/0335

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Abstract

A considerable part of historical structures in the Czech Republic calls for, or is going to call for substantial repairs or even for general reconstruction. This comes out after a long period of the past regime. To organize effective measures and investment one needs engineering geological evaluation of effects and risks regarding foundation conditions of the objects, including stability failures and effects of raw material exploitation in the area.

There is a necessity to pay prior attention to exploration of bedrock of castles and chateaus exposed on hills and slope edges, built to be seen as country dominants. The efforts are aimed at preparation of methodical instructions for objects using basic exploratory work done in the past or being under long-term monitoring. Results could be used in reviewing and remedy measures projects of further historical objects that are to be prepared by the Ministry of Culture, as well as other institutions.

KEYWORDS: historical buildings, geological hazard, anthropogenic effects, engineering geological examination, register of monuments

TUNNEL FACE STABILITY BY TRANSFORMATION FIELD ANALYSIS AND DISTINCT STATE CONCEPT

Grant Project of the Grant Agency of the Czech Republic

No. 103/03/0483

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Abstract

In the grant two procedures have been selected to describe and predict the material behaviour of rock surrounding tunnel opening. The first consisted of coupled modelling. The second issue was comparative approach. Both these approaches considered mutual influence of numerical and physical modelling in dependence of "in situ" measurements. The measurements on real-world structure of the Dobrovsky tunnel in Brno were conducted.

KEYWORDS: TFA and DSC models, experimental modelling, tunnel structures

COMPOSITE MATERIALS BASED ON GLASS FABRICS AND SILOXANE MATRIX AS SUBSTITUTIVE AND CONNECTIVE ELEMENTS OF BONES IN ORTHOPAEDICS

Grant Project of the Czech Science Foundation

No. 106/03/1167

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Abstract

A composite material was prepared, based on glass fabrics and polysiloxane, which displays mechanical properties similar to those of the human bone, and the effects of surface treatment on osseointegration were studied. The prepared composite samples with controlled open porosity were used to study by methods in vitro and in vivo the effect of the structure of the surfaces thus treated on the downgrowth of bone tissue. The purpose of the study is the application of these materials as connective and substitutive elements in bone surgery on the basis of analysis of mechanical and chemical properties and biotolerance.

KEYWORDS: composite materials, polysiloxane, biomaterials, osseointegration, surface, bone plate

NON – LINEAR ULTRASONIC DEFECTOSKOPY OF SOLIDS

Grant project of the Grant Agency of the Czech Republic

No 205/03/0071

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Abstract

The grant project was focused to evaluation of defects density in various materials (rocks, steel, and alloys) by the combination of methods of ultrasound defectoscopy, acoustic emission and electromagnetic radiation. The examined materials were mechanically loaded and heated. First experiments were realized on the steel samples. Frequency spectra provided higher harmonic frequency and it was found, that third harmonic frequency is very sensitive on the changes of quality and degradation of steel. This result was confirmed on further materials. Obtained results correlate well with monitored acoustic emission. During solving of grant project the new apparatus for very weak waves monitoring was designed and realized.

The results of research were published in international journals, in proceedings of conferences and Czech journals, too.

EXPERIMENTAL DETERMINATION OF ACCELERATION DECAY OF SEISMIC VIBRATIONS IN THE BOHEMIAN MASSIF

Project of “Program of target research and development support of the Academy of Sciences”

No: IBS3046201 (2002-2005)

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Abstract

Project “Experimental determination of acceleration decay of seismic vibrations in the Bohemian Massif” was solved in the period 2002 – 2005. The main purposes of research were experimental determination of seismic vibration acceleration decrease in the dependence on distance and magnitude of seismic source and determination of spectral acceleration response. For that purpose two seismic profiles were established linking seismic active zones: Viennese basin – Lubin rockbursts area, Viennese basin – Western Bohemian swarm region, respectively. The new authentic acceleration attenuation relation was assessed on the basis of recorded mining tremors from the Legnic – Glogow (Poland) source zone. In terms of this project two special seismic monitoring apparatus were constructed and tested - recorder of seismic response spectra and sensor for recording of seismic vibration rotational component.

KEYWORDS: seismic profile, acceleration attenuation, response spectrum, seismic waves, rotational component

**COMPREHENSIVE GEOPHYSICAL RESEARCH OF THE SEISMOGENIC
WESTERN PART OF THE BOHEMIAN MASSIF**

Grant project of the Grant Agency of the Czech Republic

No. 205/02/0381

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Abstract

The intention of the project is to conduct comprehensive geophysical research into the seismically active western part of the Bohemian Massif involving seismology, gravimetry, heat flow, magnetotellurics, and long-term monitoring of gas and mineral water compositions. The results should add to our knowledge of crustal dynamics, the stability of the upper crust, the state of crustal stress and its fluctuation in time and, consequently, of the causes of the West Bohemia/Vogtland earthquake swarms. The seismological studies will profit mainly from unique local observations of the intensive 2000 earthquake swarm and from profile data obtained within the active refraction experiment CELEBRATION 2000. Stress analyses will concentrate on both paleostress assessment and estimation of the state of stress and its variations during the swarms. Both 2D and 3D interpretations of the geophysical and geological data are expected eventually to provide an integrated geophysical/ geological model of the western part of the Bohemian Massif.

KEYWORDS: Western part of the Bohemian Massif, earthquake swarms, crustal fluids, triggering of earthquake swarms, stress field, heat flow, Deep Electromagnetic Survey