

# Študijný program / *Study programme:* Geofyzika / *Geophysics*

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## Témy dizertačných prác

1. Efekty poroelasticity na seizmický pohyb.....2
2. Efekty topografie voľného povrchu na seizmický pohyb a lokálne efekty zemetrasení.....3
3. Fyzikálne konzistentné modelovanie seizmického zdroja.....4
4. Identifikácia anomálnych podpovrchových štruktúr analýzou seizmických vln..... 5

## Dissertation Thesis Descriptions

1. Effects of poroelasticity on earthquake motion.....2
2. Effects of the free-surface topography on earthquake ground motion and site effects of earthquakes..... 3
3. Physically-consistent modelling of earthquake ruptures.....4
4. Underground structure anomaly identification using seismic waves..... 5

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**Názov / Title**

Efekty poroelasticity na seizmický pohyb

*Effects of poroelasticity on earthquake motion*

**Jazyk záverečnej práce / Language of Thesis**

anglický / *English*

**Školiteľ / Tutor**

prof. RNDr. Peter Moczo, DrSc.

**Anotácia / Annotation**

*Earthquake motion at a site is determined by earthquake source, travel path and site conditions.*

*Site conditions are characterized by a set of structural parameters. At many sites the earthquake motion can be affected by presence of underground water and thus by poroelastic parameters.*

*These effects have not been investigated yet.*

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**Názov / Title**

Efekty topografie voľného povrchu na seizmický pohyb a lokálne efekty zemetrasení

*Effects of the free-surface topography on earthquake ground motion and site effects of earthquakes*

**Jazyk záverečnej práce / Language of Thesis**

anglický / *English*

**Školiteľ / Tutor**

prof. RNDr. Peter Moczo, DrSc.

**Anotácia / Annotation**

*The Earth's curved free surface can significantly affect the seismic wavefield and earthquake ground motion. Reflection, scattering, conversion, focusing/defocusing and possibly also diffraction can individually or together produce both interesting and important seismic wavefield phenomena including specific phases or induced local waves, amplification/deamplification and differential motion. A topographic feature such as hill or ridge neighboring a sediment basin can considerably affect the earthquake ground motion inside the basin. A specific effect of topography considerably depends on the wavefield-medium configuration and the frequency range. The finite-difference method is computationally more efficient than the spectral-element and discontinuous Galerkin method for most of the earthquake ground motion studies. It is, however, a non-trivial problem to incorporate the free-surface topography in the finite-difference modelling. A PhD student is expected to elaborate one of the promising approaches.*

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**Názov / Title**

Fyzikálne konzistentné modelovanie seizmického zdroja  
*Physically-consistent modelling of earthquake ruptures*

**Jazyk záverečnej práce / Language of Thesis**

slovenský / *Slovak*

**Školiteľ / Tutor**

Mgr. Martin Gális, PhD.

**Anotácia / Annotation**

Dizertačná práca bude zameraná na fyzikálne konzistentné modelovanie seizmického zdroja s dôrazom na vyžarovanie seizmických vln s realistickým frekvenčným spektrom do vysokých frekvencií. Cieľom bude, pomocou analýzy dynamických modelov a skrytých vzťahov medzi rôznymi zdrojovými parameterami, navrhnúť zdokonalené algoritmy na generovanie kinematických modelov tak, aby sa výsledné šírenie trhliny, čo najviac približovalo šíreniu trhliny v dynamických modeloch s dôrazom na vyžarovanie seizmických vln s realistickým spektrom v širokom intervale frekvencií.

*The thesis will be focused on physically consistent modelling of earthquake ruptures with emphasis on radiation of seismic waves with realistic broad-band frequency spectra. The goal is, through analysis of dynamic rupture models and revealing of hidden relations between source parameters, to propose an improved algorithm for generating kinematic rupture models. The aim is to generate kinematic ruptures, which would be as close as possible to dynamic ruptures, with particular emphasis on radiation of seismic waves with realistic frequency spectra up to 10Hz.*

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**Názov / Title**

Identifikácia anomálnych podpovrchových štruktúr analýzou seizmických vln  
*Underground structure anomaly identification using seismic waves*

**Jazyk záverečnej práce / Language of Thesis**

anglický / *English*

**Školiteľ / Tutor**

doc. Mgr. Jozef Kristek, PhD.

**Anotácia / Annotation**

*There are lot of hidden underground structures such as cavities, old mines or caves which could be dangerous for building structures on the surface. Their identification using cheap non-invasive methods is very desirable for developers and local authorities. Advanced analysis of seismic wavefields is one of such methods.*