

PROGRESS REPORT: 2005-2007

Task Group on Scattering and Heterogeneity

IASPEI Commission on Seismological Observation and Interpretation

July 11, 2007

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Chair of the Task Group

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1. Objectives

The objectives of the Task Group are to promote the international collaborations and interactions among scientists around the world on wave propagation and scattering in heterogeneous earth. The specific tasks of the Task Group could include: Organize international meetings, workshops, training courses on the related topics; Exchange information in an international scope periodically through internet and e-mails; Compile progress reports on wave propagation and scattering in heterogeneous media, in which the theoretical and methodological progresses during the period should be summarized; Sponsor and organize special programs; Maintain a constructive relation with AGU, EGU, SEG, EAGE, SSA, SSJ, SEGJ and other regional, professional associations by co-sponsoring some symposia, workshops and training courses of common interests.

The second term started at the general assembly of IASPEI in Santiago, 2005, and the group members are as follows: Michel Campillo, Xiaofei Chen, Edoardo Del Pezzo, Mike Fehler, John Goff, Alexander A. Gusev, Klaus Holliger, Ludek Klimes, Michael Korn, Yu Kravtsov, Alan Levander, Ludovic Margerin, Satoshi Matsumoto, Valerie Maupin, Kevin Mayeda, Osamu Nishizawa, W. Scott Phillips, Haruo Sato, Serge Shapiro, Ru-Shan Wu. Haruo SATO has been in charge of the task group chair since then. The group activity has been practically supported by more number of people who have interested in the goal of our task group.

2. Web site

For exchanging scientific information about seismic wave scattering in the heterogeneous earth medium, we have maintained a special web site since 2001: <http://www.scat.geophys.tohoku.ac.jp/>. News about workshops, recent publications, and

key references are updated.

3. Workshops and sessions

After the general assembly of IASPEI in Santiago in 2005, members of the task group have actively organized following workshops and sessions:

- *Workshop on “Interpretation of physical properties of small scale heterogeneity in the lithosphere” (Convener J. Kawahara), Earthquake Research Institute, Univ. Tokyo, Tokyo, Japan, Jan.12-13, 2006.
- *Session on “Multiple Scattering, Random Wave Fields, and Dissipation” (Conveners: U. Wegler, M. Korn, and L. Margerin) , EGU General Assembly, Vienna, April 2-7, 2006.
- *Session on “Seismic wave propagation” (Conveners Nishizawa, O., H. Sato, H. Mikada, T. Matsuoka and T. Watanabe) and a Session on “Memorial session for late Kei Aki” (Conveners K. Yomogida, H. Sato, N. Hirata, M. Ukawa, and H. Kawase), Japan Geoscience Union Meeting, Makuhari, Japan, May 14-18, 2006.
- *Workshop on “Study on small-scale heterogeneities in the lithosphere: Toward understanding the characteristic structures in the earthquake source area“ (Convener K. Nishigami). Earthquake Research Institute, Univ. Tokyo, Tokyo, Japan, Oct 3-4, 2006. Summary of this workshop was published as a volume of *Chikyu Monthly* (in Japanese), Vol. 29, No.4, 207-283, 2007.
- *Session on “Seismic Imaging with Coda and Noise” (Conveners U. Wegler, M. Korn, L. Margerin, P. Roux), EGU General Assembly 2007, Vienna, Austria, April 15-20, 2007.
- *Session on “Seismic wave propagation: theory and application” (Conveners H. Nakahara, T. Watanabe, J. Matsushima, J. Kawahara and H. Mikada), Japan Geoscience Union Meeting, Makuhari, Japan, May 14-18, 2007.

4. Reports of scientific activities

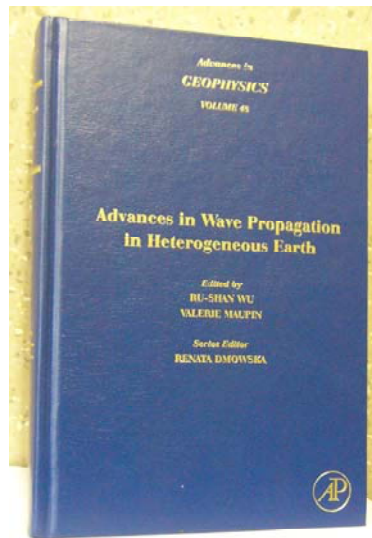
We compiled reports of Task Group members and active extended members of the Task Group as a state of the art summary for developments of studies on seismic wave propagation through earth medium heterogeneity since IUGG 2003 in Sapporo, Japan. A pdf file of this progress report “ProgRep2006.pdf” is uploaded in the Task Group web site: http://www.scats.geophys.tohoku.ac.jp/TG_Report2003_2006.html. Contributing authors are N. Biswas, E. Del Pezzo, A. Kaslilar, J. Kawahara, M. Korn, Yu. A. Kravtsov, W. S. Lee, T. Maeda, S. Matsumoto, M. Miyazawa, T. M. Müller, Y. Murai, H. Nakahara, O. Nishizawa, J. Przybilla, T. Saito, F. J. Sánchez-Sesma, H. Sato, T. Takahashi, A. Ugalde, U. Wegler and K. Yoshimoto.

5. Publications

As a scientific product of the first term chaired by Dr. R. S. Wu, a book entitled “*Advances in Wave Propagation in Heterogeneous Earth*” (Eds. Wu and Maupin) was published as volume 48 of *Advances in Geophysics Series* of Academic Press (Series editor R. Dmowska) in 2007. Chapter titles and authors are as follows:

1. Cerveny, V., L. Klimes and I. Psencik: Seismic Ray Method: Recent Developments
2. Maupin V.: Introduction to Mode coupling methods for surface waves
3. M. Bouchon and F. Sanchez-Sesma: Boundary Integral Equations and Boundary Element Methods in Elastodynamics

4. X. F. Chen: Generation and propagation of seismic SH waves in multilayered media with irregular interfaces
5. R. S. Wu, X. B. Xie and X. Y. Wu: One-way and one-return approximations for fast elastic wave modeling in complex media
6. R. S. Wu, X.Y. Wu and X. B. Xie: Simulation of high-frequency wave propagation in complex crustal waveguides using generalized screen propagators
7. Chaljub, E., D. Komatitsch, J. Vilotte, Y. Capdeville, B Valette and G. Festa: Spectral element analysis in seismology
8. Moczo, P., J. Robertsson and L. Eisner: The finite-difference time-domain method for modeling of seismic wave propagation
9. L. Huang: A Lattice-Boltzmann Approach to Acoustic Wave Propagation
10. H. Sato and M. Fehler: Synthesis of Scalar-Wave Evnvelopes in 2-D Random Media



Having received individual progress reports from active members and extended members of the Task Group, we have started to edit a book entitled "*Scattering of Short-Period Seismic Waves in Earth Heterogeneity* (tentative title)" since 2006. H. Sato and M. Fehler serve as editors of this book under the guidance of Dr. R. Dmowska. Now 15 papers are under the review process.
