UNIVERSITÀ DEGLI STUDI DI MILANO

**TO MAGNIFICO RETTORE OF UNIVERSITA' DEGLI STUDI DI MILANO** **ID CODE 5424**

I the undersigned asks to participate in the public selection, for qualifications and examinations, for the awarding of a type B fellowship at Dipartimento di Scienze della Terra Ardito Desio

Scientist- in – charge: Prof. Gianluca Fiandaca

**[Name and surname]**

**CURRICULUM VITAE**

PERSONAL INFORMATION

| | |
|---|---|
| Surname | CHEN |
| Name | JIAN |

PRESENT OCCUPATION

| Appointment | Structure |
|---|---|
| Student pursuing a PhD degree | Jilin University, China （The PhD degree will be obtained in June 2023） |

EDUCATION AND TRAINING

| Degree | Course of studies | University | year of achievement of the degree |
|---|---|---|---|
| Degree | Measurement and control technology and instrument | Jilin University | JULY 1 2018 |
| Specialization | Weak signal detection | Jilin University | |
| PhD | Earth exploration technology and instruments | Jilin University | September 2018 - June 2023 (successive postgraduate and doctoral programs of study) |
| Master | | | |
| Degree of medical specialization | | | |
| Degree of European specialization | | | |
| Other | | | |

REGISTRATION IN PROFESSIONAL ASSOCIATIONS

| Date of registration | Association | City |
|---|---|---|
| Oct 2021 | Society of Exploration Geophysicists, SEG | Changchun, China |

FOREIGN LANGUAGES

| Languages | level of knowledge |
|---|---|
| English | Fluent |
| Chinese | Professional, Fluent |

AWARDS, ACKNOWLEDGEMENTS, SCHOLARSHIPS

| Year | Description of award |
|---|---|
| 2022 | Misac Nabighian scholarship |
| 2022 | SEG/Gerald W. Hohmann Memorial Scholarship |
| 2021 | National (China) scholarship for PhD students |

TRAINING OR RESEARCH ACTIVITY

description of activity

**pursuing PhD degree, 2018.09 - present, supervisors: Prof. Jun Lin, Prof. Yang Zhang and Prof. Bo Zhang**

In the first two years of my research career, I mainly engaged in 3D forward modeling and inversion technology of surface nuclear magnetic resonance (SNMR) technology, and reviewed the technical progress of China's helicopter time-domain electromagnetic technology.

1. **2018.09-2019.10: 3D forward modeling and inversion of SNMR**

   Based on the project "Research on surface NMR 3-D groundwater inversion technology", I studied the forward modeling and inversion technology of SNMR technology in 1-D, 2-D and 3-D, and proposed to use the complex domain 3D SNMR inversion method to improve the imaging resolution of deep aquifer.

2. **2019.11—2020.6: Review the helicopter time-domain electromagnetic technology advances in china**.

   Under the guidance of Professor Lin, I summarize the main performance parameters of international representative HTEM systems, and analyzes the performance and structural characteristics of VTEM, SkyTEM and HeliTEM systems. Taking China's HTEM systems as the object of analysis, we introduce the key technologies behind the systems in detail.

At present, I am participating in the national major scientific research instrument development project chaired by my supervisor: the development of towed transient electromagnetic (TEM) system in urban underground space. This project starts in 2019 and will end in 2023. I am mainly responsible for the structural design and data interpretation of TEM system.

3. **2020.07-2020.12: Design of weak coupling compensation structure of small-loop TEM transceiver coil.**

The distance between the transmitting coil and the receiving coil of small-loop TEM is very close, and the mutual inductance coupling interference is strong, which seriously pollutes the effective signal. My first research work is to design weak coupling coil structure to suppress this interference. I proposed a new TEM structure with non-coplanar bucking compensation. Compared with the traditional design, the new structure can suppress the primary field coupling significantly, and has a better fault tolerance for the installation accuracy.

4. **2021.01-2021.06：Research on adaptive constrained quasi-3D inversion method of TEM**

   Due to the complexity of urban geology, it is difficult for conventional 3D imaging techniques to take into account both imaging efficiency and imaging accuracy. To address this issue, I propose a fast, high-resolution TEM quasi-3D imaging strategy suitable for urban geology. I convert the TEM data into pseudo-seismic wavelet (PSW) data to identify the geological correlation of the 3D spatial survey area, and then impose adaptive spatial constraints on the 3D imaging. Simulation and application case results show that, compared with conventional imaging techniques, the proposed new strategy can effectively improve imaging resolution while ensuring computational efficiency.

5. **2021.07-2021.12 ： Research on trans-dimensional Bayesian inversion method of TEM**

   The conventional TEM inversion method can give only a single optimal solution that satisfies the fitting error. It cannot evaluate the reliability of the inversion results. To obtain more comprehensive inversion results, I studied the trans-dimensional Bayesian (Trans-Bayes) inversion method. The Trans-Bayes inversion method gives the credible interval of the data model and quantifies the uncertainty in the inversion results.

6. **2022.01—present：Depth learning fast imaging for TEM data**

   Recently, I studied the application of depth learning algorithm to fast interpretation imaging of transient electromagnetic data. When the training set is representative, deep learning shows good imaging performance and efficiency. At present, I am using the depth learning algorithm (Mixture density networks) to achieve the effect similar to Bayesian inversion, which is expected to achieve seconds-level TEM probability inversion in the future.

PROJECT ACTIVITY

| Year | Project |
|---|---|
| 2018-2019 | "Research on surface NMR 3-D groundwater inversion technology" Jilin University, China |
| 2019-2023 | "Research on towed transient electromagnetic detection instrument and imaging technology for urban road geological exploration" the national major scientific research instrument development project, China |
| 2020-2021 | "Transient electromagnetic probability inversion based on trans-dimension bayesian algorithm" Jilin University, China |

PATENTS

| Patent |
|---|
| |

CONGRESSES AND SEMINARS

| Date | Title | Place |
|---|---|---|
| October 21-23,2019 | Workshop on Big Data Analytics and AI for loT Innovation Lab | University of technology sydney, Australia |
| October 24-26,2019 | Research on surface electromagnetic technology for detecting groundwater in the near-surface and in mines | Australian Resources Research Centre in Perth (Commonwealth Scientific and Industrial Research Organisation, CSIRO) |
| July 29-31, 2019 | 2019 SEG Geophysics for Smart City Development Workshop | Geosciences International Conference Center, Beijing, China |
| August, 28, 2020 | 2020 SEG Workshop on Underground Water and Karst Imaging | Online |

PUBLICATIONS

| Books |
|---|
| [title, place, publishing house, year …] |

| Articles in journals |
|---|
| **Jian Chen**, Shuai Pi, Yang Zhang, Tingting Lin. "Weak coupling technology with noncoplanar bucking coil in a small-loop transient electromagnetic system." *IEEE Transactions on Industrial Electronics*. 2022. 69, 3151-3160. |
| **Jian Chen**, Yang Zhang, Jun Lin. "High-resolution quasi-3D transient electromagnetic imaging method for urban underground space detection." *IEEE Transactions on Industrial Informatics*. 2022.(Early Access) |
| **Jian Chen**, Yang Zhang, Tingting Lin. "Transient Electromagnetic Machine Learning Inversion Based on Pseudo Wave Field Data." *IEEE Transactions on Geoscience and Remote Sensing*. 2022, 60, 5917410 |
| Jun Lin, **Jian Chen**, Yang Zhang. "Rapid and high-resolution detection of urban underground space using transient electromagnetic method." *IEEE Transactions on Industrial Informatics*. 2021, 18, 2622-2631 |
| **Jian Chen,** Jia W, Zhang Y, Lin J. "Integrated TEM and GPR data interpretation for high-resolution measurement of urban underground space." *IEEE Transactions on Instrumentation and Measurement*. 2022, 71, 5004409. |
| Jun Lin, **Jian Chen**, Fei Liu, Yang Zhang. "The helicopter time domain electromagnetic technology advances in China." *Surveys in Geophysics*. 2021. 42, 585-624. |
| **Jian Chen**, Yang Zhang, Jun Lin. "Fast transdimensional Bayesian transient electromagnetic imaging for urban underground space detection." *Measurement*. 2022, 187, 110300. |
| **Jian Chen**, Yan F, Sun Y, Zhang Y. "Applicability of Transient Electromagnetic Fast Forward Modeling Algorithm with Small Loop." *Progress in Electromagnetics Research M*. 2020, 98(1), 159-169. |
| **Jian Chen**, Yang Y, Wan L, Lin T. "Surface Magnetic Resonance Tomography for Three-Dimensional Groundwater Using a Complex Model." P*rogress in Electromagnetics Research C*. 2020, 105, 101-115. |
| Tingting Lin, Yue Li, Yusheng Lin, **Jian Chen**, Ling Wan. "Magnetic resonance sounding signal extraction using the shaping-regularized Prony method." *Geophysical Journal International*. 2022, 231, 2127-2143. |

| Congress proceedings |
|---|

| |
|---|
| [title, structure, place, year] |

OTHER INFORMATION

| |
|---|
| Programming language: Python, Matlab |
| Software mastered: COMSOLMultiphysics, ANSYS Electronics Desktop, Microsoft Office |
| Passion for film, comedy and music |
| Account ORCID: https://orcid.org/0000-0001-8728-8921 |
| h-index: 2; total citation:17; number of ESI high cited articles: 1; total impact factor: 58.01 |

Declarations given in the present curriculum must be considered released according to art. 46 and 47 of DPR n. 445/2000.

The present curriculum does not contain confidential and legal information according to art. 4, paragraph 1, points d) and e) of D.Lgs. 30.06.2003 n. 196.

Please note that CV WILL BE PUBLISHED on the University website and It is recommended that personal and sensitive data should not be included. This template is realized to satisfy the need of publication without personal and sensitive data.

Please DO NOT SIGN this form.

Place and date: Jilin Province, China. 30/09/2022