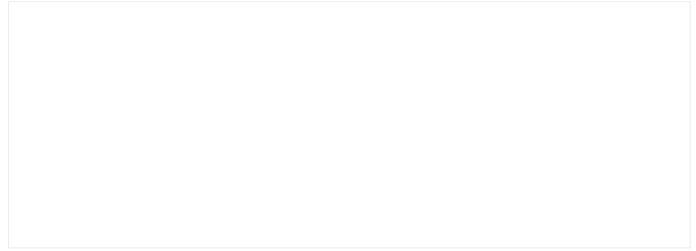


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**Sujet de post-doctorat : traitement d'images multi-échelle et multi-cadence  
avec application aux géosciences**

**Subject: Post-doctoral position in Multiscale/Multirate Image Processing with  
Applications in the Geosciences**

**Organization: IFP**

Location: Rueil-Malmaison, France  
Deadline: Open until filled (beginning 1st semester 2010)  
Duration: 12 months  
Gross salary: from ~2400 euros

**Context:**

IFP has an opening for a post-doctoral position in its Technology, Computer Science and Applied Mathematics Department. IFP is located in Rueil-Malmaison, France, near Paris. The position offers the possibility of collaboration with the Signal and Communications group at University Paris-Est.

IFP is a world-class public-sector research and training center, aimed at developing the technologies and materials of the future in fields of energy, transport and the environment. It provides public and industry stakeholders with innovative solutions for a smooth transition to the more efficient, more economical, cleaner and sustainable energies and materials of the future.

IFP fosters knowledge transfer between long-term fundamental research, applied research and industrial development in keeping with the recommendations of the Barcelona European Council held in March 2002. IFP is funded both by a State budget and by resources provided by private French and foreign international partners.

**More information on the Web :**

<http://www.ifp.fr/>  
<http://www.ifp.com/>  
<http://www-igm.univ-mlv.fr/LabInfo/equipe/signal>  
<http://www-syscom.univ-mlv.fr/~pesquet/>

**Topic:**

The topic proposed for this post-doctoral position is focused on the analysis of geophysical data and their filtering with the help of multiscale/multirate image processing algorithms.

Historically, the complexity of seismic data and its interpretation have contributed to the development of several efficient signal processing tools such as the wavelet transform.

In certain seismic data however, different wave types mixed together cannot be separated easily by standard random noise filtering schemes. In order to remedy this issue, efforts have been underway to use models that can be partially matched with data in order to allow for adaptive identification or subtraction. The aim of the proposed work is to develop innovative techniques for multiscale/multirate data/model matching. The eventual goal is to exploit simultaneously model and sparse features in the transformed domain with the recently developed directional wavelets and filter banks, based on local multiscale attributes.

While the proposed subject is focused on seismic applications, it is strongly related to more general issues in model based signal processing and detection theory, found in many areas of engineering and science.

#### **Related references:**

C. Chaux et al., 2006, IEEE Trans. Image Processing 15(8) 2397-2412, doi: 10.1109/TIP.2006.875178

Image Analysis Using a Dual-Tree M-Band Wavelet Transform

[http://ieeexplore.ieee.org/xpl/freeabs\\_all.jsp?isnumber=34713&arnumber=1658102](http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?isnumber=34713&arnumber=1658102)

A. Droujinine, 2006, J. Geophys. Eng. 3 59-81, doi: 10.1088/1742-2132/3/1/008

Multi-scale geophysical data analysis using the eigenimage discrete wavelet transform

<http://www.iop.org/EJ/abstract/1742-2140/3/1/008>

J. Gauthier et al., 2009, IEEE Trans. Signal Processing, doi: 10.1109/TSP.2009.2023947

Optimization of Synthesis Oversampled Complex Filter Banks

[http://ieeexplore.ieee.org/xpl/freepre\\_abs\\_all.jsp?isnumber=4359509&arnumber=4982760](http://ieeexplore.ieee.org/xpl/freepre_abs_all.jsp?isnumber=4359509&arnumber=4982760)

#### **Qualifications:**

- (1) A PhD degree in Electrical Engineering (signal or image processing, computer vision, Computer Science, Applied Mathematics), or other related experience;
- (2) Programming skills with MATLAB and C/C++;
- (3) Excellent skills in signal/image analysis;
- (4) Knowledge in Geophysics is desirable but not required;
- (5) Knowledge in wavelets and filter banks is highly desirable.

#### **Application procedure:**

Candidates should send an application letter with a PDF detailed CV, together with a list of publications, a PDF copy of their PhD Thesis and at least two reference letters.

Documents should be sent at: laurent(d.o.t)duval@ifp(d.o.t)fr

For further information, please contact:

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