様式2 (Form 2)

（2015年3月改定）

滞在型研究員報告書
Activity Report for the NAOJ Visiting Fellows Program

所　　属 (Institution)	KU Leuven (Belgium)
氏　　名 (Name)	Tom Van Doorsselaere
研究課題名 (Research subject)	Forward modelling of coronal oscillations
滞在期間 (Period of stay)	2015 年 06 月 01 日～ 2015 年 06 月 12 日 YYYY MM DD YYYY MM DD
受入責任者氏名 (NAOJ host researcher)	Patrick Antolin

１．滞在型研究員として国立天文台滞在中に行った活動について簡単にお書きください。
(Summarize your activities during your stay.)

During the stay we have performed 2 major tasks:

1. We have transformed the previously constructed FoMo code (numerical code for forward modelling of solar coronal plasma emission, https://wiki.esat.kuleuven.be/FoMo) into an easy-to-use library. Moreover, an incredible speedup has been obtained (a factor of 50 compared to the version before the visit).
2. We have performed forward modelling of numerical models of transversely oscillating coronal loops into commonly used SDO/AIA channels. The key feature of these loop models is that they have a non-uniform temperature. The non-uniform layer further broadens via the Kelvin-Helmholtz instability, which is expected in the presence of these waves. On the forwarded models, we have used Differential Emission Measure (DEM) inversion methods: this is a standard tool for solar physics data analysis. By comparing with the observed DEM distributions in the corona we can assess the viability of our model.

２．今回滞在型研究員として得られた成果について簡単にお書きください。
(Summarize the outcome of the stay.)

The main results can be summarised as follows:

1. We have created a numerical library FoMo that is easy-to-use, fast and will be widely spread. In the future, extensive documentation for the newly developed software will be written, allowing for easy access and use. A review article on the code in the Frontiers journal has been scheduled and will be submitted on October 2015.
2. We have shown that the DEM method applied to simulated coronal loops with multi-shelled temperature inhomogeneity also finds broad DEM distributions, comparable with observations. We find that the simple multi-shelled configuration can explain the observations, and not just the widely used multi-strand loop model. Particularly fit to observations are broad multi-shelled temperature inhomogeneities. Such distributions are obtained in our model from transverse MHD oscillations, due to the generated turbulence via the Kelvin-Helmholtz instability. Since transverse MHD oscillations are generally observed in the solar corona, this result provides a natural explanation to the observed broad DEMs. The next step involves further investigating the behaviour of the DEM with the loop parameters. This compilation of the result during the project and the future results will be submitted as an article in the near future.

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３．この制度について何か御意見がありましたら、お書きください。 (Please provide any comments about this program.)
Drs. Van Doorsselaere and Antolin find the program well implemented, especially for its flexibility and low administrative and bureaucratic requirements. This program is very attractive and effective.