Geosci. Instrum. Method. Data Syst. Discuss.,
doi:10.5194/gi-2016-1-RC1, 2016

Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "Practical considerations for enhanced-resolution coil-wrapped Distributed Temperature Sensing" *by* K. P. Hilgersom et al.

Anonymous Referee #1

Received and published: 23 March 2016

#general comments The paper entitled "Pratical considerations for enhanced-resolution coil-wrapped distributed temperature sensing" focus on practical issues related to coil-wrapped Distributed Temperature Sensing. For informed experimenter of DTS measurements, it is well known (many publications can be found) that the accuracy of temperature measurements can be decreased by several effects: non uniform differential attenuation between Stokes and Anti-Stokes signals along a coil, non uniform strength reduction of signal for coil of small diameters, solar radiation. The interest of the paper is to make a wakeup call of these effects by the analysis of datasets of real experiments.

Note: a poster entitled "Practical considerations for coil-wrapped Distributed Temperature Sensing setups" was already presented at EGU2015 (session HS1.1: Innovative techniques and unintended use of measurement equipment)

In the paper, there is no mention of the DTS system calibration used for the experiments. Did you use the manufacturer-internal calibration? And what are the configurations of the measurements for each experiments : single-ended or doubled-ended measurements? The double-ended measurements accounts for spatial variation in the differential attenuation of the anti-Stokes and Stokes signals. Did you try to use a manual configuration? Is it applicable for fiber optic wrapped on a cylinder of small diameter? Are there criteria of diameters and length of fiber optic wrapped on a cylinder for which the manual configuration of the double-measurement can not be applicable?

#specific comments

- in part 1 introduction and §5 : The figure 1 is not useful. On the other hand, readers might appreciate to find : a short summary of the definition of the spatial resolution published by Tyler and al. and basic equations for the coil resolution and the stuffing factor

- in part 2.1 influence of coil diameters and §5 : As underlined in the paper, the differential attenuation between Anti-Stokes and Stokes signals could be important in case of narrow cable bends. For readers unfamiliar with guiding properties of fiber optic, it might be useful to develop the paragraph §5 ("second, the altered differentiation ...). Moreover, the sentence "the usually abundant Stokes signal has more of its modes near the critical angle of acceptance ..." should be reformulated.

- in part 2.1 influence of coil diameters and §5 : Could you explain in more details why the double-ended procedures are not applicable to evaluate the differential attenuation along the fiber path in the case of narrow bends? Does it gives too noisy results?

- in part 2.2.2 Modelling the radiation effect and §2 : A figure of the model for the situation 1 and 2

- in part 3.1 Influence of coil diameters : the analysis of the measurements are not well presented. Perhaps, this section should be rewritten to clearly show the 3 results given

in the part 4.1

- in part 3.1 Influence of coil diameters : at the end of the part 3.1, readers might appreciate to find a short summary of the results (create a subsection 3.1.1 "Analysis of measurement data", move part 4.1 into 3.1.1 and move also part 4.3 after $3.1.1 as $3.1.2)

- in part 3.2 Influence of radiation : change part 4.2 into 3.2.3

- in part 3.2.2 Modelling the radiation effect: at the end of the $3.2.2, readers might appreciate to find a explanation of the hysteresis pattern like the one mentioned in conclusions

#technical corrections

+Unclear sentences : - in part 1 introduction and §2 : "scattered light in fibre can have a wavelength decrease towards a temperature sensitive anti-Stokes signal or a wavelength increase towards a relatively temperature insensitive Stokes signal"

- in part 2.1 influence of coil diameters and §2 : "In this paper, we focus on the effects of narrow cables bends on signal loss, ..."

- in part 2.1 influence of coil diameters and §3 : "This attenuation follows from the larger fraction of .... . A lower number of remaining light modes leaves larger ..."

+Typing errors:

- In the title of figure 5 : "(m-1)" -1 in superscript

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., doi:10.5194/gi-2016-1, 2016.