Sent: Friday, August 16, 2013 11:54 AM
To: John M. Dealy, Prof. john.dealy@mcgill.ca Cc: Orbey, Nese <Nese_Orbey@uml.edu>
Subject: RE: relaxation spectra
Attachment: derivations for John Dealy

Hi John,
attached are my derivation of some time ago and suggestions for improvement. I hope that this helps. Please let me know as you advance your study.
Best, Henning

From: John M. Dealy, Prof. [john.dealy@mcgill.ca]
Sent: Friday, August 16, 2013 11:15 AM
To: Horst H. Winter Cc: Orbey, Nese
Subject: RE: relaxation spectra

Henning,
Thank you for your reply. The key issue for me is the conversion from a discrete to a continuous spectrum. Eq. (9) is for narrow spacings in general, and (9) is for narrow equidistant spacings. And I think that the "a" in equation 17 is an average factor for an entire set of non-equidistant spacings. I would like to know the basis of Eq. (9), as the others follow from it.
My former doctoral student who is now at UMASS-L is Nese Orbey. She and I wrote a paper on this subject in 1991.
Regards, John

From: Horst H. Winter [mailto:winter@ecs.umass.edu]
Sent: August 15, 2013 6:07 PM
To: John M. Dealy, Prof.
Subject: RE: relaxation spectra

Dear John,
it has been "a couple" of years ago that I worked on this. Please give me some time to think back. The equation that you wrote seems to belong to equidistant modes. We quickly moved to variable spacing. I will sketch the derivation and send it to you separately.
I will visit Lowell on Sept 19 and might see your formal postdoc there
Best, Henning
H. Henning Winter, PhD
Distinguished University Professor
University of Massachusetts Amherst
winter@ecs.umass.edu

From: John M. Dealy, Prof. [john.dealy@mcgill.ca]
Sent: Thursday, August 15, 2013 4:21 PM
To: Horst H. Winter
Subject: relaxation spectra

Dear Henning,

You will recall that some time ago you were kind enough to provide me with a copy of IRIS for my personal use in a retirement project. This has gone slowly, but with the assistance of a former doctoral student of mine who is trying to start an academic career late in life at UMASS-Lowell, I am making some progress. Because your method for inferring a continuous spectrum from data is by far the most used by rheologists I am trying to understand it in detail. I have almost worn out my copy of the 1992 JNNFM paper, and I seek your help in understanding a key issue. Equation 9 is of central importance, and I would like to understand its origin. You say "..one may choose geometric averages." on page 18, and then on page 19 you mention that "This specific choice gives acceptable results as will be shown below." This wording suggests that at this point it is an empirical hypothesis and say later on page 19 that "Consistency tests confirm the conversion procedure." At the bottom of page 21the use of the factor a is called a "shifting" process, and your results reveal that this procedure works very well. Finally, Eq. 17 can be re-written as follows:

[cid:image002.png@01CE99D3.87D5AD80] (Some people use N to mean the number of relaxation times, which is your N+1)

This seems to be an average value of a that can be used when spacing is not equidistant. Is this correct?

What I am trying to work out is the origin of relationship 9. Others have used it without saying where it comes from or with reference to your 1992 paper. And Cho and Park (J.Rheol., 57, p. 647, 2013) claim that it can be derived from the mean value theorem, but I do not believe this. If I have understood correctly, your argument is as I have described above, and I am satisfied with this, but do you know of any other basis for it?

Many thanks for your help.

Best regards, John
John M. Dealy, Professor Emeritus
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