

## Response to Anonymous Referee #2

Referee's comment	Modification
1) page 4, line 5: I am not sure that the cementation exponent is sufficient to fully describe the geometry of the porous medium!	In the Bussian model the mixing of the electrical parameter is controlled by the cementation exponent, the porosity and the values of the electrical parameter of the solid and the fluid phases. Since the last three of these parameters are not related to the arrangement of the pore space, all the pore space geometrical control does therefore reside in the cementation exponent. Furthermore, please note that I said in the paper "...where $m$ is the cementation exponent, which describes the geometry of the porosity,..." which is very different thing than what the referee calls "...the geometry of the porous medium!" Since there is clearly the possibility of mis-interpretation I have replaced the phrase "..., which describes the geometry of the porosity..." by "...which describes the effect that the arrangement of the pore space has on the electrical parameters...".
2) page 6, line 22: the fact that $\sigma_{eff}$ , $\epsilon_{eff}$ or $\kappa_{eff}$ appear on both the left-hand and right-hand sides of the equations does not imply the non-linearity (we can imagine a linear system with each term on both side)! The non linearity is due to the combination of simple and powered terms...	Thank you. The phrase "... , as indicated by the presence of either $\sigma_{eff}^*$ , $\epsilon_{eff}^*$ or $\kappa_{eff}^*$ on both the left and right-hand sides of the equation." has been deleted.
3) page 7, lines 9 to 12: the sentence is not clear. It needs to be reformulated. I think also that a paragraph describing the principle of the conformal mapping technique would help the reader, and will equilibrate with the paragraph where the bisection method is described.	The sentence has been modified and a paragraph of 123 words describing the conformal mapping method has been added.
4) Figure 4 is not so commented as figures 2 and 3. Are there here convergence/divergence problems for the imaginary part (as before for the real part)? If yes, please detail.	Yes there are the same problems – I have added 95 words to describe them.
5) page 2, line 12: I am not sure that the probability given here (from Student test) is speaking. Rather use the classical adjustment coefficient $r^2$ to quantify the fitting here.	Following the comment of Referee 1, I have chosen to delete the results of the $t$ -test as trivial because the correlation coefficient is so close to unity. We already describe why we previously use $1-r$ instead of the correlation coefficient $r$ . I do not think that adding the values of $1-r^2$ would add much to the paper, but I have done so for completeness.
6) page 5: maybe add some references for the different methods listed.	All of these methods are described and some of them have efficient codes in the work of <a href="#">Press et al. (2007)</a> . I have added a sentence to refer the reader to that seminal work rather than give individual references directly.
7) The construction of section 4 is a little bit confusing. I think that the paragraphs [page 8 line 8 - page 9 line 6] has to be placed at the beginning, and followed by	I have removed the reference to the figures from the first paragraph and placed them later. This does not completely remedy the problem because Fig. 3 is now

the paragraphs [page 7 line 16 - page 8 line 7]-[page 9 line 7 - ...]. Or remove from the first paragraph the reference to the figures.	called out before Fig 2. hence, I have swapped the order of these figures in the MS to ensure that the progression is logical.
8) page 11, line 17: please give the type of processor (e.g. intel Core quadro), and the exploitation system. Maybe this information should be provided to the reader before the details about the performances.	“ <i>Intel Core 2 Quad</i> ” and “ <i>Microsoft windows XP Professional</i> ” added. I have chosen to leave the information where it is rather than promote it so that the reader may give priority to the results, and remembering that only a few will need to know the details of the processor, which is now obsolescent.
9) Table 1: Columns 3 and 4 can be merged since they are identical (for instance, "from the classical bisection method and conformal mapping technique").	OK – done.
10) Figure 2: There is a problem with the curves. Maybe plot the bisection results with continuous lines of different colors, and superimpose the conformal mapping results with dotted black lines.	The referees suggestion has been implemented.
11) Add the symbol "TM" after each "Maple", "(R)" after Matlab and Mathematica	I have inserted <sup>TM</sup> after all occurrences of Maple to avoid confusion with the tree of the same name, and have added® after Matlab and Mathematica.
12) page 2, line 26: "and its special case": not clear. Are some words missing here?	The fact that de Witte explored a special case of Archie’s law is not relevant to this paper. Hence I have concatenated the two references rather than explaining the special case in more detail.
13) page 3, line 20: "of void" rather than "of free space"	I was unsure of this so I looked it up. According to CODATA 2006, the proper terminology for this parameter is the “electric constant”. I have made the required modification.
14) page 6, line 12: sigma star = sigma prime plus i times sigma second	Done.
15) page 6, lines 17-18: remove the definition of epsilon 0, since it appears earlier in the text	Done.
16) page 7, line 5: "soluble"? you mean "solvable"...	Indeed I do, thank you – modified.
17) page 7, line 10: "Cn]-inf,0]", not "Cn(-inf,0]"	I have verified the original as correct by asking an expert in complex number theory. No change.
18) page 8, line 4: "phi = 0.2 ;"	Done.
19) page 8, line 5: "10-3 S/m ; 10-5 S/m"	Done – Many thanks for the detailed reading of the MS.