

Interactive comment on “Particle Loss Calculator – a new software tool for the assessment of the performance of aerosol inlet systems” by S.-L. von der Weiden et al.

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Received and published: 4 June 2009

General Comments

This describes a useful new tool for quickly calculating expected passing efficiencies of particles through different inlet and tubing geometries. The program uses standard equations not only to calculate losses in existing geometries, but also can be used as a tool to aid in design of new measurement systems. This should be a valuable community resource that extends the Excel-based "Aerosol Calculator" that has been available for a number of years. This paper describes the equations used in the "Particle Loss Calculator," how to use the program, and some validation of its performance. Overall

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the document is well written and appropriate; below are minor specific suggestions to fine-tune it.

Specific Comments

p. 1102, lines 10-11. As it is not specified, I suggest noting here and on the download page that this is an IGOR program, and IGOR is necessary to run it. Also it would be useful to note on the download page that users can get a free IGOR trial on the Wavemetrics website.

p. 1103, line 8: Most equations are only valid for a specific range of conditions which, while usually described in this paper, are not readily apparent when running the PLC program. A desirable upgrade would be to include pop-up windows that alert the user whenever the conditions are violated (for example, when a critical Re or Stk is exceeded). This is not required for publication; just a suggestion for future improvement.

Equation 1: I think it would be clearer, and less redundant, if this initial equation just defined inlet efficiency as the product of sampling efficiency and transport efficiency. The latter two quantities are already defined separately as Equations 2 and 19.

p. 1103, line 19: I found the implementation of particle size, dp , a little confusing. Here it is defined as just "size", while on line 9 of p. 1104 it is "aerodynamic diameter". In the program, it seems to be physical diameter, since the particle density is a chosen quantity. Please clarify and use appropriate symbols throughout.

p. 1103, line 19. "Efficiency" should be defined here at the beginning. Also, the later definitions of efficiency are inconsistent—on p. 1105 it is given in terms of "concentration", on p. 1107 in terms of "number density" and on p. 1107 and 1122, in terms of "number". Suggest using "number concentration" or "number density" consistently throughout.

p. 1105, line 3: Something should be said about the "sampling in moving air" conditions for which the equations are likely to be invalid—for example during high-speed aircraft

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sampling.

p. 1105, line 23: Move (Stevens 1986) to the end of the equation.

p. 1106, line 16: Perhaps the dynamic shape factor should be defined, or at least the reference given later (Seinfeld and Pandis) should be included here.

p. 1107, line 10: A quantitative definition of thin vs. thick walled probes would be useful here.

p. 1107, elsewhere: A single figure showing all the different angles invoked (angle of inclination, aspiration angle, angle corresponding to the vertical, and half-angle), while not essential, would be valuable.

p. 1109, line 21-22: It would be appropriate to mention here that there is an option in the program to extend the laminar equations through the transition regime.

p. 1112, Eqn 27: Is this valid over the full Re range? Also, in section 2.3.6, wouldn't the half angle for eddy formation also depend on Re?

p. 1112, section 2.3.4: Are these completely independent of the radius of curvature? If not, the applicable range should be specified.

p. 1114, lines 13-15: This statement should have a reference.

p. 1115, line 5: Who has this been confirmed by? The authors?

p. 1116, section 3: I think the paper would read better if this introductory section (through approximately line 22 on p. 1117) was moved up, before the equation details currently given in Section 2.

p. 1117, line 5: Delete "to" before "preferable". Line 11: I believe "emitted" should be "omitted".

p. 1118-1120: This is a nice discussion of the working details of the program, and the ability of the user to select various options should be quite useful. If this is to be

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a community resource, I would suggest that the download page also have a link for comments or corrections to be submitted to the authors.

p. 1123, line 6: Delete or change the word "widespread", which seems vague. Line 13: what do you mean by "partial" sedimentation?

p. 1124, lines 7-9: There is something wrong with the grammar here—as written, it indicates that you do NOT recommend that inlet designs be kept simple.

Fig. 2: It would be useful if the symbols used in the equations for the various Sampling and Tubing Parameters were included in the two boxes at the top of the figure.

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 1099, 2009.

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