

Discussion on a comment on avalanche paper not previously reported in P&G

i.e. Comment about scaling and sand avalanches

P. Evesque

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Abstract :

Testimony #1 was produced to “la Cour administrative d’Appel” in Paris; so the following correspondence is no more private but open to anybody and can be used by anybody refereeing to it. Here this concern a comment I submitted to Phys Rev Lett in 1991 on finite size effect in avalanches.

Pacs # : 5.40 ; 45.70 ; 62.20 ; 83.70.Fn

In 1990, 2 papers on sand avalanches were proposed for publication to Phys. Rev. or/and Phys. Rev. Let. by P.Evesque. The referees wanted to combined them, developing the content. This was done and gave *Phys. Rev. A* **43**, 2720 (1.March.1991) (91 quotations), meanwhile the 2 previous papers were accepted by *J. de Physique France* **51**, 2515-2520, (Nov. 1990) (11 quotations) and *Europhys. Lett.* **14**, 427-432, (1/3/1991) (8 quotations). A little later, the author found appearing in the Phys Rev A literature a new paper (Phys.Rev. A43, 7091(1991)) published 1.6.1991(80 quotations) by C.H.Liu, H.M. Jaeger and S.Nagel describing similar effects as those described in the *Europhys. Lett.*, contained in the previous submission to Phys. Rev.

Phys Rev or Phys Rev Lett could provide the first submission date of the first papers by P. Evesque, this will identify the correct schedule and gives the priority to him. Nov. 28, 1991, the date of the MRS meeting is just after the publication of J. de Phys paper. So it is clearly much after the first reviewing.

Despite the modification, this paper was not accepted. I do not feel it normal or fair.

References:

- [1] P. Evesque: *J. de Physique France* **51**, 2515-2520, (Nov. 1990)
- [2] P. Evesque: *Europhys. Lett.* **14**, 427-432, (1/3/1991) (8 quotations)
- [3] <http://defense-pierre-evesque.over-blog.com/>, in general; and http://www.poudres-et-grains.eu/datas/suite_affaire_2/3rr-mem-22.4.16-CAA.pdf which makes public the private peer-reviewing correspondence.
- [4] http://poudres-et-grains.eu/datas/temoignages/Temoig-1_editionsCL-23-6-11.pdf , pp. 73-83

Refus (1992) par PhysRev A du Comment by P.Evesque & P.Porion on C.H.Liu, H.M. Jaeger, S.Nagel, Phys. Rev. A 43, 7091(1991)

Comme je l'ai dit, ce troisième cas est légèrement différent: c'est celui des 3 articles suivants :

- P. Evesque, *Phys. Rev. A* **43**, 2720, (1991), Analysis of processes governing sandpile avalanches using soil mechanics results and concepts
- P. Evesque, *J. de Physique France* **51**, 2515-2520, (1990), Granta gravel model of sandpile avalanches: towards critical fluctuations?
- P. Evesque, *Europhys. Lett.* **14**, 427-432, (1991), Analysis of processes governing sandpile avalanches using triaxial test results and "critical state" of soil mechanics.

J'avais soumis les deux derniers à PRL, qui ne m'a donné son accord que pour publier un article plus complet (i.e. le premier). Compte tenu de ceci, j'ai ressoumis ces deux articles à Journal de Physique et à Euro physics Lett. Avant de soumettre à PR A le 1^{er} dans la foulée.

J'ai été surpris de voir paraître dans Phys Rev. A « communication rapide » un article par Nagel et al. Expliquant les effets de taille fini, ce que j'expliquais aussi dans le 3^{ème} article.

J'ai essayé de publier un comment avec P. Porion. Ce qui m'a été refusé par Phys Rev A. (voir Comment on1992)



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TRAN NGOC LAN
Chef de la Section
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MGP/55/90

NOTE pour Monsieur BONNET

Je vous prie de trouver ci-joint, pour information, deux projets d'articles que M. Pierre EVESQUE, en stage à la section PMGP, a soumis à la revue Physical Review Letters.

TRAN NGOC LAN

P.J./2

Copie : MM. BILLARD - CHEVRIER - LEVY
FREMOND (UMR 113)

21 April 1992

Dr. P. Evesque
Lab. de Mecanique
Sols, Structures et Materiaux
Ecole Centrale Paris
Grande Voie des Vignes
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Re: Comment on ``Finite-size effects in a sandpile''

By: P. Evesque and P. Porion

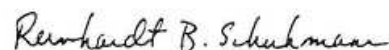
APK451

Dear Dr. Evesque:

In accordance with our usual policy for Comments, the above manuscript was sent to the author(s) of the work being commented on. Their reaction is enclosed.

We will consider this further if you choose to respond. An independent referee will be consulted if needed. Please accompany any resubmittal by a summary of the changes made, and a brief response to all recommendations and criticisms.

Yours sincerely,


Reinhardt B. Schuhmann
Senior Editorial Assistant
Physical Review A

The Comment (#APK451) to our "Finite-size effects in a sandpile" basically raised two relevant points: 1) one theoretical argument presented in our paper was already stated by one of the authors in Phys. Rev. A43, 2720 (1991); 2) the reference 6 in our paper should have been to Conference on Powders and Grains page 217 (1989) edited by J Biarez and R Gourves.

Although our paper was received by Phys. Rev. A five days after the publication of theirs, actually one of us had publicly presented the theoretical argument earlier in the MRS meeting at Boston on November 28, 1990. It is very unfortunate that we overlooked their paper when we prepared our manuscript, but their paper had not appeared in print by the time we sent ours in to the journal. We apologize for this omission.

I do not understand the relevance of the rest of the comment to our original paper. The authors of the comment assumed a "misunderstanding" which never existed, and continued to clarify it by restating some old arguments in their earlier Phys. Rev. A paper. They try to "strengthen" these ideas in the statements a), b) and c) in the first page, which are just a summary of their earlier paper. As such they are not adding any new ideas in this comment. Nevertheless, I still do not think the statements a) and b) have much to do with our paper nor do I think argument c) is the only answer. In the last two paragraphs of page one, they again restate the ideas of their old paper and emphasize its importance in case we "misunderstand" it.

On the second page, they cited their statements concerning the finite size-effect. I agree on statement 4), they deserve the credit for first stating it. Statements 1), 2), 5) and 9) address the importance of the density instead of size, hence I consider them irrelevant to our original paper named "Finite-size effects in a sandpile". Although the argument of statement 3) is relevant, we have already presented the same result in an even earlier paper Phys. Rev. Lett. 62, 40(1989). The idea that the avalanches correspond to a first order transition was also suggested in this earlier paper of ours. In statement 6) and 7), they give the conclusion obtained from an energy estimation based on some assumptions. It is not a rigorous argument with either experimental or theoretical support, hence we think the behavior of sandpile at different sizes still lacks explanation. Finally, statement 8) in the conclusion section is just a repetition of statement 4). In all these cases they are simply referring to the statements of their earlier published paper.

In conclusion, I would not recommend the publication of this comment, since it contains no new material other than ideas from their old PRA paper nor will it stimulate any discussion on physics. Instead, if they write a sentence saying they have a prior claim to the theoretical argument, I would not object to that as a comment.

Thank you for your help.



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Châtenay, February 20, 1992

to: Editorial office of the
Physical Review A,
Box 1000, RIDGE, NY 11961-2701
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Dear Sirs,

Please find enclosed three copies of a comment by P. EVESQUE and P. PORION on the paper entitled "Finite size effects in a sandpile" by C.-H. Liu, H.M. JAEGER and S.R. NAGEL, Phys. Rev. A43, 7091, (1991). We would like to publish it in your journal.

Sincerely yours,

Comment to "Finite-size effects in a sandpile" by C.-H. LIU, H. M. JAEGER
and S. NAGEL, (Phys. Rev. A43, 7091 (1991))

by P. EVESQUE and P. PORION

Laboratoire de Mécanique: Sols-Structures-Matériaux, URA 850
Ecole Centrale Paris, F-92295 Châtenay-Malabry, France.

The C.-H. Liu et al. paper is very interesting and presents new experimental results. However, we want to remark that the theoretical arguments were already stated in a paper of one of us (P. Evesque, Phys. Rev. A43, 2720 (1991)), referred in the following as PE-PRA: analogy with the phase transitions, finite size effect, etc... This paper shows also that experimental $\langle \delta\theta \rangle$ is independent of the sandpile size and grain diameter, and consequently of the length L . One will find the precise passages of PE-PRA which state these points at the end of this comment. But let us first remark few points.

We think that this omission reveals a misunderstanding of the real contents of this paper, which comes likely from a difficulty of language. This misunderstanding is induced undoubtedly by the introduction of some concepts and experimental results of soil mechanics which are new for physicists, although they are classical in soil mechanics. But, it seems to us that it is necessary to learn this language and concepts. The better way to strengthen this idea is to recall that PE-PRA foresees other phenomenons which are interesting for physicists and allow their interpretations:

a) For instance, it foresees that one of the controlling parameters of the order transition is the density.

b) It also gives a measurement of the dilatancy effects.

c) It demonstrates using energy dissipation arguments why the avalanche transition is necessarily a first-order transition when $\langle \delta\theta \rangle$ is non-zero and why the P. Bak et al. model (BTW model) is valid when $\delta\theta=0$.

The nice results of Held et al. (Held et al., Phys. Rev. Lett. 65, 1120-1123 (1990)) are referred as ref. 29 in PE-PRA (G. Grinstein et al. (unpublished)).

We want to rectify a minor error of citation in Liu et al. paper: its ref. 6 does not contain any study of $\delta\theta$ as a function of the bead diameter d ; this study may be found in PE-PRA previously quoted.

Endly, one may find a complete outlook of the most important results of PE-PRA in its abstract. We would like to mention that this paper contains some experimental results and few theoretical consequences. It also describes a theoretical analysis of the avalanche problem and integrate it in a larger framework which accounts also for many other results of soil mechanics, even if it is sometimes within an approximate way.

We hope having convinced that even if the formalism of PE-PRA is different from what physicists are familiar, the results already contained in this paper prove that this approach deserves to be studied and developed.

We turn now and mention the precise passages of Phys. Rev. A43, 2720, (1991) which are concerned with finite size effects in sandpile avalanches:

- 1) In the abstract, we emphasize the part plaid by density and on its possible control for observing $1/f$ noise.
- 2) At the end of the introduction (ii) (p. 2722 col. A), we emphasize the effect of density as a controlling parameter of $\delta\theta$.
- 3) End of section III-C (3 last paragraphs) (p. 2726 col. B):
We demonstrate that $\delta\theta$ is a constant independent of the bead diameter d ; cosequently, $\delta\theta$ does not depend on the pile size.
- 4) Last paragraph of section III-E (p. 2728 col. B) contains explicitly the "finite size law" ($h/\sin\theta=L=2*R_{cyl}$) and the given explanation is quite similar to Liu et al. but it has been established, submitted and published formerly (prior to their submission date).
- 5) In section V-B last but one paragraph (p. 2736), PE is comparing the avalanche process to a first-order transition with an adjustable controlling parameter which can make the system critical.
- 6) In Section V-C (p. 2737, col. 1), Energetic estimates for different processes make clear why the system exhibits a first order transition when $L*\delta\theta>d$.
- 7) In p. 2736, Fig. 15 caption mentions the existence of two different cases depending on whether $\delta\theta$ is larger or smaller than d/L .
- 8) Last part of paragraph 1 of conclusion (p. 2737, col. 2), the relationship between d/L and $\delta\theta$ for obtaining $1/f$ noise is clearly printed.
- 9) Last but one paragraph of conclusion (p. 2738-39) contains an analysis of the avalanche flow in terms of a first order transition which may switch to a second order one when adjusting the controlling parameter (i. e. density).

Acknowledgement: P.P. wants to thank Mr J.-L. Durville and Dr G. Joly for their encouragements, the Région Nord-Pas-de-Calais and the L.C.P.C. for financial support.



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Châtenay, May 28, 1992

to Editor of Phys. Rev. A
P.O. Box 1000, RIDGE, NY 11961, USA

Dear Sirs,

Please find enclosed a revised, shortened and clearer version of the paper APK451, A15/KI. We have understood that the preceding version of the paper was containing too many details. We think however that its contents deserves to be published since it concerns any physicist who is interested in sandpile physics.

We would like also to insist on the importance of its publication to preserve the interest of ref. ², since a referee of ref ³ (i.e. a specialist of avalanche processes) has been arguing that ref ³ was not attributing to ref ¹ the interpretation of the finite size effect to reject the paper. We still maintain that this interpretation may be found already in ², which is anterior to ¹. This point is accepted in a very fairplay fashion by C.H. Liu et al. (see answer of these authors to the comment).

Yours sincerely,

P. EVESQUE

P.S. The first time that P. Evesque has publicly presented the theoretical argument was in France in Journées Suspensions-Lits Fluidisés, Carry-le-Rouet, France, (May 28-30, 1990)

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p.60/238

Comment to "Finite-size effects in a sandpile" by C.-H. LIU, H. M. JAEGER and S. NAGEL, (Phys. Rev. A43, 7091, (1991))¹

by P. EVESQUE and P. PORION

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C.-H Liu et al. paper¹ is quite interesting and present new experimental results. However, we want to remark that the theoretical arguments were previously stated in ref ² (see for instance in ² last paragraph of section III-E, p. 2728 col. B).

Furthermore, one can ask from ref ¹ what is (or are) the controlling parameter(s) of the avalanche size. This is partly answered in ref ², since soil mechanics results have been used to argue that it is the pile density which controls the avalanche size. This last point has just been confirmed experimentally ³ ; but it is also demonstrated experimentally in this forthcoming paper ³ that the pile density is not the only parameter controlling the avalanche size. This demonstrates the complexity of the phenomenon and validates (at least partly) the soil mechanics approach which quantifies the dilatancy effect^{2, 4} and relates it to the pile density.

Acknowledgements: We want to thank C.-H LIU, H.M. JAEGER and S. NAGEL for their fairplay. P.P. wants to thank J.-L. DURVILLE and Dr G. JOLY for their encouragements. We want to thank LCPC and the macro-gravity program of the French MRT for financial support; P.P. wants to thank Région Nord-Pas-de-Calalais for financial support.

REFERENCES

- ¹ C.-H. LIU, H. M. JAEGER and S. NAGEL, (Phys. Rev. **A43**, 7091, (1991))
- ² P. EVESQUE, Phys. Rev. **A43**, 2720, (1991)
- ³ P. EVESQUE, D. FARGEIX, P. HABIB, M.P. LUONG and P. PORION, submitted to Phys. Rev. lett.
- ⁴ O. REYNOLDS, Philos. Mag. V series, **20**, 469, (1885)

Answer to C.-H. LIU, H.M. JAEGER and S. NAGEL

We have taken into account most of the remarks of these authors; in particular, we have shortened strongly the comment.

We have appreciated greatly the fairplay of the authors. For the very little story, and this is quite unimportant, the first time that P. Evesque has publicly presented the theoretical argument was in France in Journées Suspensions-Lits Fluidisés, Carry-le-Rouet (May 28-30, 1990).

As accepted by the authors, we still maintain a sentence for saying that we have a prior claim to the theoretical argument, since it was the subject of a criticism of a referee of ref³ paper.

We still maintain also a brief discussion on the parameters which might control the avalanche size; since this question is important for sandpile physics and since it demonstrates that soil mechanics point of view may enlighten this physics, even if much more works remains to be done to get a good understanding of sandpile physics.