



Universiteit
Leiden
The Netherlands

Mechanical response of foams : elasticity, plasticity, and rearrangements

Deen, M.S. van

Citation

Deen, M. S. van. (2016, November 9). *Mechanical response of foams : elasticity, plasticity, and rearrangements*. Casimir PhD Series. Retrieved from <https://hdl.handle.net/1887/40902>

Version: Not Applicable (or Unknown)

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/40902>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/40902> holds various files of this Leiden University dissertation

Author: Deen, Merlijn Seward van

Title: Mechanical response of foams : elasticity, plasticity, and rearrangements

Issue Date: 2016-11-09

Mechanical Response of Foams:

Elasticity, Plasticity, and Rearrangements

PROEFSCHRIFT

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof. mr. C.J.J.M. Stolker,
volgens besluit van het College voor Promoties
te verdedigen op woensdag 9 november 2016
klokke 11.15 uur

door

Merlijn Seward van Deen

geboren te 's-Gravenhage
in 1988

PROMOTOR

prof. dr. M.L. van Hecke

PROMOTIECOMMISSIE

dr. M.L. Manning (*Syracuse University, Syracuse, Verenigde Staten*)

prof. dr. P. Schall (*Universiteit van Amsterdam*)

dr. Z. Zeravcic (*ESPCI, Parijs, Frankrijk*)

prof. dr. J. Aarts

prof. dr. E.R. Eliel

dr. D.J. Kraft

prof. dr. M.A.G.J. Orrit

prof. dr. V. Vitelli

NEDERLANDSE TITEL

Mechanische eigenschappen van schuim:
elasticiteit, vervormbaarheid en herschikkingen.

COVER IMAGE

A 4096 particle packing (with periodic copies) at $P = 10^{-4}$.
Intensity variations indicate variations in the local stress.

Casimir PhD series, Delft-Leiden, 2016-30

ISBN 978-90-8593-274-1

Available on-line at <http://hdl.handle.net/1887/40902>

This work is licensed under the CC-BY-SA 4.0 license.

De waarheid is een raadsel, en dat gaat als volgt:
't is een goede vriend, maar altijd te laat.

Spinvis, *Smal*film.

CONTENTS

1 INTRODUCTION	7
1.1 Jamming	10
1.2 Foams	12
2 CONTACT CHANGES OF SHEARED SYSTEMS	15
2.1 Introduction	16
2.2 Method & protocols	16
2.3 Numerical results	24
2.4 Linear response	36
2.5 Multiple contact changes	49
2.6 Alternative scaling models	57
<i>Appendix</i>	
2.A Finite size scaling of $\rho(u_{\parallel})$ and $\rho(u_{\perp})$	71
3 REARRANGEMENTS IN SHEARED DISORDERED SOLIDS	75
3.1 Introduction	76
3.2 Methods	77
3.3 Classification of contact changes	78
3.4 Reversibility	79
3.5 Preliminary results	84
3.6 Conclusion and outlook	90

4 SHEARED FOAMS	93
4.1 Introduction	93
4.2 Setup and protocol	94
4.3 Post processing	103
4.4 Results	108
4.5 Discussion and conclusion	128
<i>Appendix</i>	
4.A Reversibility	129
SUMMARY	131
SAMENVATTING	133
PUBLICATION LIST	135
CURRICULUM VITAE	137
ACKNOWLEDGMENTS	139
BIBLIOGRAPHY	141

