# 第６８回 広島数理解析セミナー （２００３年度）

## Hiroshima Mathematical Analysis Seminar No.68

日時 ： **１２月１２日（金）１５：００～１６：００**

場所 ： **広島大学理学部 Ｂ７０７**

講師 ： Professor Reinier van der Hout （International University Bremen, Germany）

題目 ： Nematic liquid crystals and harmonic maps

要旨 ： This work has been motivated by the study of pressure-driven flow of a nematic liquid crystal (n.l.c.) through a long circular cylinder.

A nematic liquid crystal is a fluid, equipped with a field $\mathbf{u}$ of preferred directions (of unit length), with an associated energy density $e(\mathbf{u}) := k|\nabla \mathbf{u}|^2 = k\Sigma_{i,j}\left(\frac{\partial u_i}{\partial x_j}\right)^2$. This energy-density establishes a link with *harmonic maps* into the unit sphere $S^2$.

We discuss some solved and some open problems for cylindrical flow of an n.l.c.. Then, we discuss the related problem of symmetric harmonic maps $D^2 \to S^2$ and their heat flows, with $D^2$ the unit disk. Especially, we discuss the phenomenon of discrete energy-concentration and the question whether concentrated energy can be recovered; this question is closely related to the non-uniqueness of the heat flow. Finally, we discuss the nonoccurrence of multiple simultaneous energy-concentration events.

Much of this is joint work with Michiel Bertsch, Roberta Dal-Passo and Elisabetta Vilucchi (Roma II).

広島数理解析セミナー幹事

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