

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Emergence of Anisotropy in Flock Simulations and Its Computational Analysis¹ MOTOHIRO MAKIGUCHI, JUN-ICHI INOUE, Hokkaido University — In real flocks, it was revealed that the angular density of nearest neighbors shows a strong *anisotropic structure* of individuals by very recent extensive field studies [Ballerini *et al*, *Proceedings of the National Academy of Sciences USA* **105**, pp. 1232-1237 (2008)]. In this paper, we show that this structure of anisotropy also emerges in an artificial flock simulation, namely, *Boid simulation* by Reynolds [C.W. Reynolds, *Flocks, Herds, and Schools: A Distributed Behavioral Model, Computer Graphics*, **21**, pp. 25-34 (1987)]. To quantify the anisotropy, we evaluate a useful statistics, that is to say, the so-called γ -value which is defined as an inner product between the vector in the direction of the lowest angular density of flocks and the vector in the direction of the flock is moving. Our results concerning the emergence of the anisotropy through the γ -value might enable us to judge whether an optimal flock simulation seems to be *realistic* or not.

¹We were financially supported by Grant-in-Aid Scientific Research on Priority Areas “Deepening and Expansion of Statistical Mechanical Informatics (DEX-SMI)” of the MEXT No. 18079001.

Motohiro Makiguchi
Hokkaido University

Date submitted: 21 Oct 2009

Electronic form version 1.4