



2014 AASRI Conference on Circuit and Signal Processing (CSP 2014)

# On Qualitative Properties of Incompressible Cluster Flow on the Ring Network

Buslaev A.P.<sup>a\*</sup>, Strusinskiy P.M.<sup>b</sup>

<sup>a</sup>Moscow State Automobile and Road Technical University, 125319, Moscow, Russia, Leningradskiy avenue 64

---

## Abstract

Simulation cluster flow modeling is considered on ring networks. Cluster behavior is investigated in every network, theoretical and numerical results are obtained, theorems and proofs are formulated, program model results are obtained.

© 2014 The Authors. Published by Elsevier B. V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/3.0/>).

Peer-review under responsibility of Scientific Committee of American Applied Science Research Institute

*Keywords:* Cluster; ring network; flow; simulation model.

---

## 1. Introduction: Cluster on the ring

A **cluster** is a segment  $[a, b]$  of particles with a density of  $y$ ,  $0 \leq y \leq 1$  and a length of  $x = b - a$ . The cluster moves in certain direction on the ring with a velocity of  $v = F(y)$ . If there are obstacles, it stops (incompressible).  $F$  is a state function.

*Example of state function.*

---

\* Corresponding author. Tel.: +7-499-1550436.  
E-mail address: [apal2006@yandex.ru](mailto:apal2006@yandex.ru).

$$v(y) = v_{\max} \left( \frac{y_{\max} - y}{y_{\max}} \right)^p,$$

where  $p$  is parameter,  $0 < p < \infty$ .

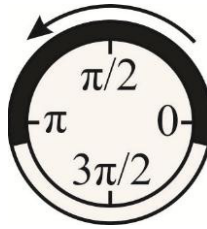


Fig.1. Cluster on the ring, 0-network

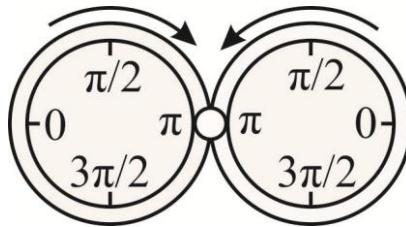


Fig.2. 1-network is a molecule

## 2. Ring network

A **ring network** is a set of rings on the plane. Rings touch each other in the common nodes. Multiplicity (number) of touches in one node is not more than two. Let's classify ring networks by *number of touches*, *number of common nodes for one ring*. This value is constant, except rings, which are located on the border of the network. Besides, the notion "regular networks" includes *equidistribution* of common nodes on the ring.

## 3. Isolated movement of uniform clusters

**Isolated movement** of clusters in the ring network is a movement of each cluster on its own ring in a certain direction with the rule *FIFO (first input, first output)* of common nodes. Let all clusters be **uniform**. That is, they have *equal density* and, therefore *equal velocity*. Since the relative measure of the set of initial conditions, that lead to the competition of clusters for a common node within a limited period of time, equal to zero, we will not consider possible scenarios of settling conflicts. However, if it is significant, we can consider the *equiprobable method of regulating movement of two clusters through a common node*.

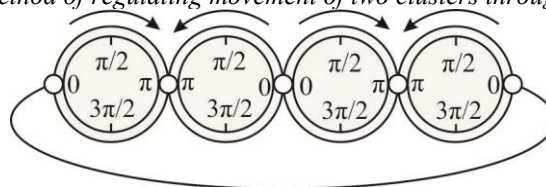


Fig.3. 2-network is a necklace

Download English Version:

<https://daneshyari.com/en/article/568231>

Download Persian Version:

<https://daneshyari.com/article/568231>

[Daneshyari.com](https://daneshyari.com)