3.Conclusions

We discussed the occurrence of nonsmooth bifurcations leading to the formation of limit cycles in switching circuits and systems and appearance and disappearance of equilibrium points through border-collision bifurcations. A variable structure circuit was used to show their occurrence in Filippov systems. Many open challenges lie ahead. Current work is focussing on extending the analysis presented here to the case of three-dimensional and higher order systems.

A classification of all (or at least most) of nonsmooth transitions possible in nonsmooth systems must be attempted. We wish to emphasise that the onset of stable oscillatory motion, often coexisting with stable equilibria or other attractor, is highly undesirable in many applications.

Thus, giving conditions for the efficient detection of these event (which we recall are not associated to pair of complex eigenvalues crossing the imaginary axis as for smooth systems) is of utmost importance in applications.

ACKNOWLEDGMENTS
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Software optimisation for the design, construction and testing of trawling techniques

1. Introduction

Technology in the fishing sector is advancing rapidly. Examples of these advances include new types of techniques and net control sensors**.** The Spanish fishing industry has lagged behind other European countries in as far as existing software able to calculate, design, draw and simulate trawling techniques(in three dimensions with movement), is concerned. The project **Software optimisation for the design, construction and testing of trawling techniques.** introduces software to cover these needs.

This SARTI project is financed by the National Program for Scientific and Technical Data Transfer (PETRI PTR1995-0735-OP), the participating organizations are UPC and CSIC (ICM). The main researcher is Francesc Sarda (ICM) and the collaborators are: Antoni Mànuel, Josefina Antonijuan, Joana Prat (UPC) y Olga Gualdo (CTVG), y Arnau Folch (CSIC)

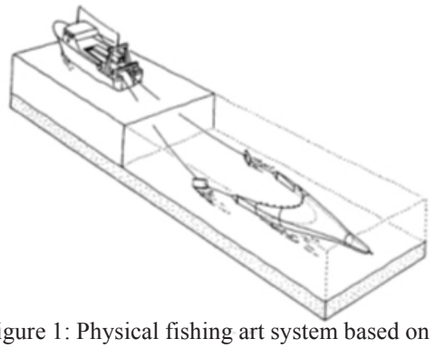

Figure 1: Physical fishing art system based on a ship, cable, doors and fishing net

2. Description

The objectives of this project are to:

- Find a mathematical model for the fishing arts physical system.
- Create a user-friendly graphical interface that simulates the system.
- Offer the product for pedagogical and industrial purposes.

We have started off by considering a simplified model where there is fishing art symmetry in the direction of the ship, the cable has no twist, the doors remain vertical and a stationary problem is considered with uniform current. For every part force and/or momentum equilibrium are imposed and the overall system is resolved numerically.

The input parameters in the physical system simulation are water density, velocity of the ship, depth and type of sea bed, the physical data of the cables and doors, the weight that the net trawls and its characteristics

Once the numerical simulation has finished, the length of cable, doors aperture and separation, net aperture and separation, tensions and special positions of the door and every cable point and net aperture will be known.

At present there is a graphical interface (based on OpenGL) where different kinds of fishing nets, doors, and cables present in the market can be selected and which also allows the results from the simulation to be monitored.

At the same time, the simulation obtained from the mathematical model using real data from fishing ships is under study.

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Hardware-Software Co-Design for Fingerprint Biometric Identification

Abstract.- This paper describes the design of a specific architecture for fingerprint identification based on a hardware-software co-design. This work summarizes the main stages involved in a classical fingerprint feature extraction algorithm. The paper proposes a hardware-software partitioning based on a profiler deduced from the execution of the whole algorithm running in a Pentium 1.7 GHz.

1. Introduction

Determining the identity of a person has become a critical task in a global and inter-connected society. Cash terminals, ATM machines, access control systems and internet transactions are some examples of security systems where the user's identity is fundamental information. Biometrics measures physiological or behavioural characteristics that allow reliable identification. Some well-known biometrics such as voice, fingerprint, iris, face or hand geometry are the basis of civilian and forensic identification systems today. Fingerprint identification is perhaps the most common biometrics method employed in the field of authentication [1]-[4] because it is cheap, the capture devices are small and it has a high algorithms recognition rate.

The identification accuracy of a biometric system is measured with the false (impostor) acceptance rate (FAR) and the false (genuine individual) reject rate (FRR). The FRR/FAR ratios depend, among other factors, on the type and difficulty of the algorithms used in the fingerprint feature extraction [1]. Usually, algorithms with high-medium complexity lead to acceptable low FRR/FAR. However, as it becomes more complex the computational cost increases which leads to undesirable high processing times. Thus, the overall performance of the identification system should be evaluated in terms of FRR/FAR, computational cost and others factors such as security, size and cost.

The hardware platform chosen to implement these algorithms must take into account all these parameters. A standard microprocessor solves (by software) the algorithms executing a set of functions written normally in a language such as C or C++. Typically, these functions employ high level primitives, as for example convolutions based on Gabor filters. This platform is neither quick nor cost efficient, even if an integer optimized code is used.