

Toward the Design of ElectroMagnetic Sensors

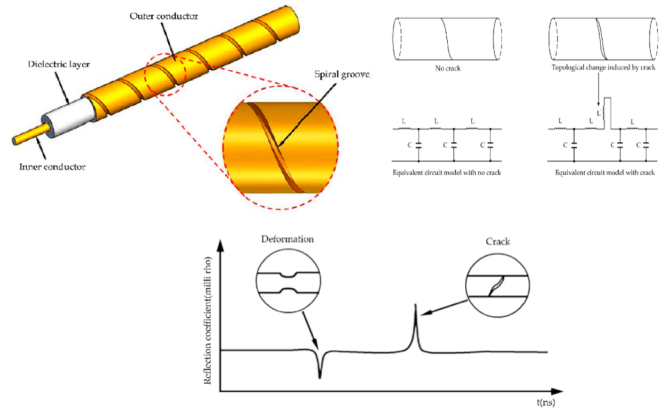
Context and Objectives

The aim of the project is to develop a system based on a microwave sensor and explore the possibilities of using the wide-frequency-band response to track one particular parameter in a complex medium.

As each parameter, depending on its size and its physical and/or chemical properties, would present its own frequential signature, the use of a broadband response would be key to isolate each parameter response. Associated with other sensors such as Inertial Motion Unit (IMU), this type of sensor should further be able to help Structural Health Monitoring (SHM) or Non Destructive Test to monitor heterogeneous structures such as aircraft wings or bridges.

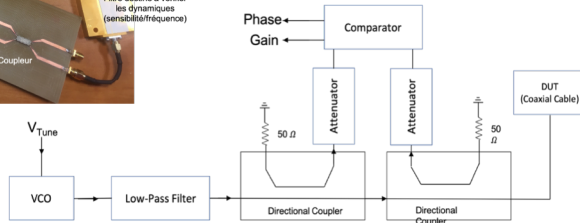
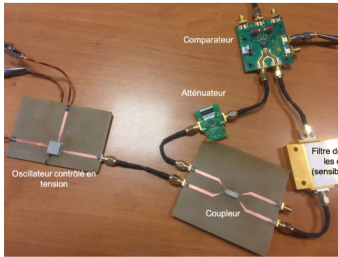


Microwave Sensor Modelling

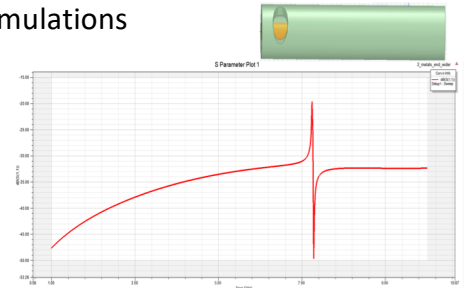


Z Zhou, T Jiao, P Zhao, J Liu, H Xiao
"Development of a distributed crack sensor using coaxial cable"
Sensors, Vol. 16, no. 8, august 2016

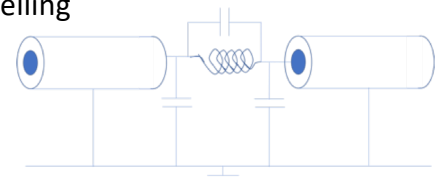
System Architecture & Realization



Simulations



Modelling



Data fusion and Power Management

Detection algorithm

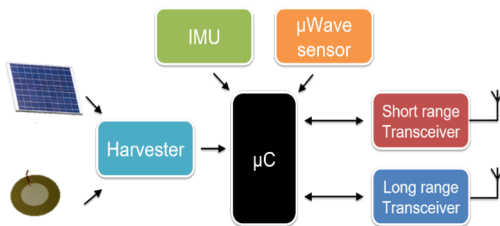
Recognition of frequency response variation (Gain / Phase)
Data Fusion with IMU

Battery powered system

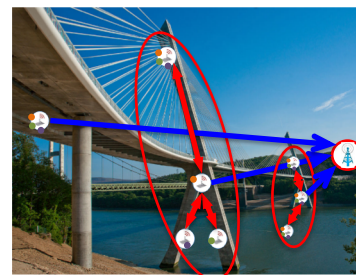
Low power processing
Energy harvesting
Power management



IRISA Zyggye light prototype



Perspectives



Work toward defined applications

Fusion with data provided by other sensors

→ CominLabs Project Proposal



DIMO