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## CABLE MONITORING

Vincent Le Cam, Frédéric Bourquin

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# CABLE MONITORING

## Break detection & localisation by acoustic sensors

In view of safety, structure durability and cost efficiency, detection of wire breaks is a strategic component of cable monitoring. Knowing the number of breaks and their location contributes to understand the health of the structure. Acoustic emission emerges as one of the favourite non-destructive evaluation technique. LCPC develops wire and wireless acoustic sensors that provide a reliable cable health monitoring.

### Localisation principle

Detection is possible by means of 3 acoustic sensors labelled 1, 2, 3 according to the time of arrival of the wave generated by the break. Sensors 1 and 2 receive the wave first. Break occurred between sensors 1 and 2. The wave speed is computed as :

$$V = L_{31} / \Delta t_{31}$$

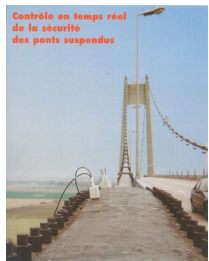
and the distance between the break location and sensor 1  
Writes :

$$X = \frac{1}{2} * (L_{12} - V * \Delta t_{12})$$

where  $\Delta t_{jk}$  denotes the difference between the time of arrival at sensors j and k.

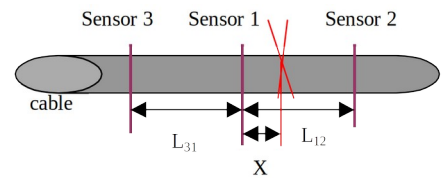
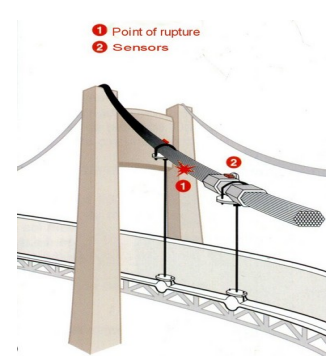
### Applications

- Sensors are 10 m equispaced
- Ruptures are detected with an accuracy of +/- 15 cm
- The system provides alarms to bridge operator and successfully predicted critical health of bridges in service



Monitoring of Tancarville and Iseron bridges

### Detection principle



### Wireless platform



Wifi Sensor



Supervisor

### New developments

New **wireless sensor network**, based on DSP and the emerging TCP/IP wireless protocol : WIFI

Enabled functionalities

- Accept heterogeneous measured data
- Record the full signal signature when wire breaks occur
- Organise the monitoring in an event-driven process

Vincent Le CAM ([vincent.le-cam@lcpc.fr](mailto:vincent.le-cam@lcpc.fr))

Laboratoire Central des Ponts et Chaussées

France