

## **Simulation of Brillouin and Rayleigh scattering in distributed fibre optic for temperature and strain sensing application**

### **Abstract**

This paper presents simulations of a distributed fibre optic sensor for temperature and strain sensing. The behaviours of Brillouin and Rayleigh scattering in optical fibres are studied through the backscatter signals. The simulations taken into account the presence of coherent Rayleigh noise (CRN), which is the dominant noise source. The analysis includes the characteristics of backscatter signals when affected by temperature and strain. A new algorithm is developed to efficiently determine the backscattered Brillouin signal for a given input pump power. All the developed simulation models exhibit exceptional analysis accuracy as verified through comparison with the published measurement results.

### **Keywords**

Brillouin scattering; Coherent Rayleigh noise; Distributed fibre-optic sensors; Rayleigh scattering