

## **Development of a current sensor based on active materials for high-voltage transmission systems**

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### **Abstract-**

**This paper presents the development of a new class of current sensor based on active materials for high-voltage transmission systems. This current sensor is an innovative design with respect to conventional current measurement transformers. The alternating current signal to be measured induces a magnetic field in an emitter which consists of a magnetostrictive material. The emitter transforms the current magnetic energy into mechanical energy in the form of mechanical waves due to the alternating nature of the induced magnetic field. These waves are transmitted through a dielectric structure until a piezoelectric stack, the receiver, is reached which converts the mechanical energy back into electrical energy. An electronic signal module processes this low electrical current and estimates the primary current to be measured. A numerical model has been developed to evaluate the preliminary design. A small scale prototype has been built and tested to demonstrate the feasibility of the current sensor. Experimental data have been used to fit the damping parameters of the model.**

### **Index Terms-**

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