

ABSTRACT:

The earlier research shows that the electrical capacitance sensor through the tomography technique is applicable in flow visualization or image reconstruction, named as Electrical Capacitance Tomography (ECT). ECT can be used for imaging industrial multi-component processes involving nonconducting fluids and solids in pipelines. The electrical capacitance sensor is a non-invasive device that uses non-intrusive technique to measure the concentration of flow inside a closed pipe by measuring variations in the dielectric permittivity of the material. The capacitance of the sensor changes when the mean dielectric constant between the electrodes varies due to variations in the percentage of gas and liquid flowing in the pipe. The acquired concentration profile that obtains from capacitance measurements is able to imaging liquid and gas mixture in pipelines, meanwhile the system development is designed to attach on a vessel. The electrode plates which act as the sensor previously has been assemble fixed on the pipeline, thus it causes difficulty for the production to have any new process installation in the future. Therefore on-board sensing plate offers a new design and idea on ECT system which is portable to be assembled in different diameter sizes of pipeline, and it's flexible to apply in any number due to different size of pipeline without redesign the sensing module. The on-board sensing plate development contains signal conditioning circuit and sensing electrode built in a single module (embedded on single plate). In this paper, the details on fabricating the sensors electrodes, had been described, including signal conditioning circuit/electronic part of measurement, such as stray immune capacitance measurement circuit, amplifying circuit, AC to DC converter circuit and filter circuit.