Multiphase Pipeline Flow Research: Challenges of Scale-up and Opportunities for Process Intensification

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The NSERC Industrial Research Chair in Pipeline Transport Processes is a multimillion dollar research collaboration among the Canadian government, companies from the oil and gas and mining industries and the University of Alberta. The primary purpose of the research program is to (a) advance the understanding of industrial multiphase flows and (b) improve engineering practices so that multiphase flow processes themselves are properly scaled up, designed, implemented and controlled. By understanding and then controlling key operating parameters, significant energy efficiency, reliability and process intensification improvements can be obtained. In this presentation, a number of examples related to unconventional oil recovery and multiphase pipeline flow assurance will be described, and some of the challenges associated with the identification of governing mechanisms as a multiphase process is scaled up from the laboratory to the field will be highlighted. Additionally, some possibilities to "control" turbulence to enhance particle suspension or reduce pipeline erosion will be considered.