

## **PhD**

### **Title: Dynamic Response of Flexible Risers due to Unsteady Internal Multiphase Flow**

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#### **Objective**

Develop a computational tool which simulates the fluid-structure interaction of a flexible riser carrying an internal multiphase flow.

#### **Motivation**

Subsea oil-gas production is one of the most important activities of the petroleum industries around the world. Due to its aggressive neighborhood and its extreme operation conditions, frequently engineers and researchers must face unexpected and undesired phenomena which can compromise their installation, facilities and activities.

Among the phenomena that can occur during a subsea oil-gas production, severe slugging is one of the most dangerous. It is because, the high pressure fluctuations and internal forces, originated by this phenomenon, can cause vibrations on the riser structure. These vibrations can produce large deflections and stresses; consequently, taking the flexible riser to fail by fatigue, excessive bending or local buckling.

#### **Scope**

Due to the importance of preserving the integrity of flexible risers, a study of the influence of severe slugging through this device is been performed. So, the response of a flexible riser structure under this phenomenon will be determined.

In order to carry out this study, two currently running programs are been coupled. The first is the RIFLEX, program developed by the Marintek. This code can perform non-linear dynamic analysis of flexible risers. The second, the SLUGGIT is a program built by the Multiphase Transport Group - EPT. This code can simulate slug flow through pipes and risers. Its formulation is based on the slug tracking model. These two programs will work together with the aim of exchange information, so that one will be the feedback of the other.

The gotten results will be validated by comparison with available numerical and experimental data of particular cases. These results will help to analyze the performance of flexible risers undergoing a severe slugging.