Instrumented Robotic Platform for Guiding the Geotechnical Design of Offshore Pipelines

AMERICAN UNIVERSITY OF BEIRUT
FACULTY OF ENGINEERING AND ARCHITECTURE

Proposal Submitted by:
Elie Shammas (***Principal Investigator)***
Assistant Professor
Department of Mechanical Engineering

Co-Investigators:
Shadi Najjar
Assistant Professor
Department of Civil and Environmental Engineering

Daniel Asmar
Assistant Professor
Department of Mechanical Engineering

Salah Sadek
Professor
Department of Civil and Environmental Engineering

Imad Elhajj
Associate Professor
Department of Electrical and Computer Engineering

Abstract
As the development of offshore hydrocarbons moves into deeper water, pipelines have become an increasingly significant part of overall offshore facilities and infrastructure (Cheuk et al. 2007). In fact, pipelines play the role of arteries for offshore oil and gas facilities. They are the main transport mechanism for hydrocarbon products between subsea facilities which are often connected by pipelines to a single processing platform (Fig. 1). This main production platform may in turn be connected to shore by long export pipelines which could be more than 100 kms in length.
Randolph and Gourvenic (2011) report that typical costs of gas export pipelines on the North-West Shelf of Australia exceed $4 million per km, a significant proportion of which is for measures to stabilize the pipe on the seabed. The stability of pipelines under the action of external hydrodynamic loading from waves and currents and internal loading from the elevated temperature and pressure is governed by geotechnical considerations that are still being investigated and are just being understood (Palmer and King 2008). This is because the analysis of pipelines is an area of offshore geotechnics that is poorly developed. Randolph and Gourvenic (2011) state that the first ever review of the topic of pipeline geotechnics was established in 2005 in the ISFOG conference.