The 9th International Conference on Coasts, Ports and Marine Structures (ICOPMAS 2010)
Tehran, Iran, 29 Nov.-1 Dec. 2010

Lateral Impact on Pressurized and Continuously Supported Offshore Pipelines

[Hamid . Arabzadeh حمید عرب زاده
[مصطفی زین الدینی Mostafa . Zeinoddini]
Keywords: Pipeline, Lateral Impact, Internal Fluid, Dent

1- Introduction

Pipes are often subjected to heavy accidental transverse loads, which may cause significant damages. The pipes' ability to absorb the applied load energy and transform it into plastic deformation is of the particular interest in many practical engineering purposes. Furthermore, the response of oil and gas pipelines under transverse load conditions, caused by trawl gears or anchors, is of particular importance, because of the possible catastrophic consequences [1]. These typical examples are illustrated in figure 1. Many studies have been carried out to evaluate the serviceability of damaged cylindrical members [2]. It is important to consider these effects, particularly in the presence of a relatively high pressure fluid in the pipe [3].

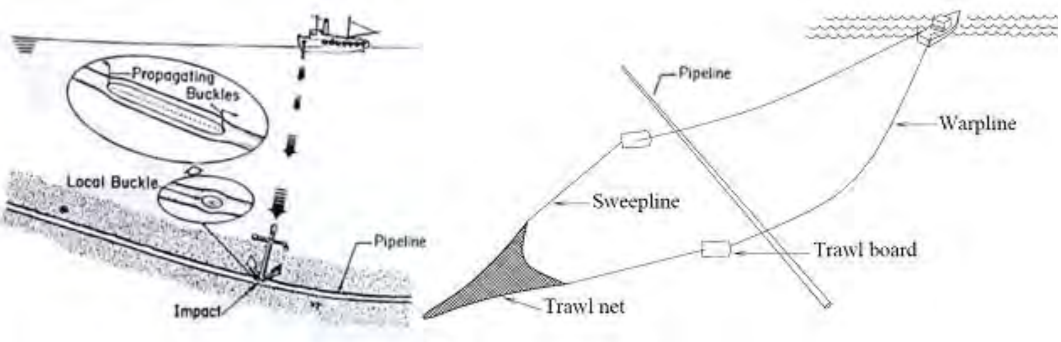

Fig. 1(Lateral impact on pipelines [4]

The subject of lateral impacts on tubular members has received considerable attentions in the literature. Two-dimensional response of metal tubes under transverse (lateral) compressive loads has been first investigated experimentally and analytically in 1963 [4–6]. The lateral load was applied through rigid plates and remained constant along the tube. Reid and Reddy [7] conducted additional research to account for strain-hardening effects, to improve the previous works. Reid and Bell [8], experimentally investigated the response of rings under two diametrically opposed concentrated loads. They also proposed an analytical model to evaluate the major parameters which affect the capacity of tubes under transverse compressive loads [9]. Ghosh et al. [10] extended this work to investigate the response of short-length tubes and rings under opposed concentrated loads. Leu [11] examined the two-dimensional collapse of aluminum tubes of various diameter-to-thickness (D/t) ratio under lateral compression between two rigid plates, using a nonlinear finite element simulation.