Fa S a Me d NeEX™ f Se c D a f Ga D b Ne À

1. Introduction

A fast, accurate algorithm, "NeEX™," which was developed by the JFE Group as a program and makes it possible to analyze stress and strain in buried pipes regardless of their shape [1, 2], is introduced.

In this report, an imaginary network based on a road map of a coastal area was used as an example to demonstrate the high-speed analysis performance of "NeEX™".

"NeEX™" is a powerful tool for seismic design and preventive measures in pipeline industries such as city gas companies.

2. Simulation Method

The general method for seismic diagnosis is evaluation by finite element analysis (FEA) using shell elements or beam elements, considering the nonlinear pipe-soil interaction. However, that method requires excessive calculation time when applied to widespread pipeline networks.

A fast simulation program for seismic diagnosis is deformation analysis of a distribution network against seismic waves and comparison with the strength of each pipe. This method enables rapid analysis of pipeline deformation while maintaining accuracy and taking into account not only the stress-strain relationship of the pipes but also the shape of the network and differences in soil conditions around buried pipes. A distribution network can be idealized with many segments which are each composed of one straight line and two boundary elements (**Fig. 1**).

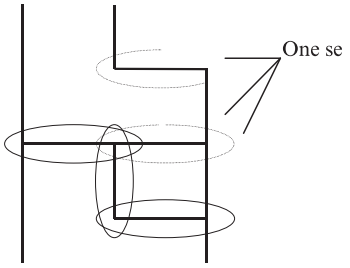

Fig.1 Image of a network and segments

3. Seismic Diagnosis of Networks

3.1 Segments to Idealize Distribution Network

In this study, the network is not the same shape as an actual buried pipeline network in an urban area, but

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