4

IMPROVED LEAK DETECTION SYSTEM USING DATA

An improved leak detection system for pipelines is presented in this chapter. A sequence of steps to develop the state-of-the-art system using the data can be seen in Figure 4.1. The comprehensive information on the transient modelling and simulation of gas mixture flow in pipelines using the OLGA dynamic simulator is discussed in this chapter. Another exciting thing to explore is how the simulation data can be used to identify a much simpler gas mixture flow model. The concept of adaptive thresholds for leak detection and various performance indices to evaluate leak detection performance are also introduced in this chapter.

Data Collection

In this step, data related to the general properties of natural gas and its components are collected and organised. First, the species and their composition (moles) in the natural gas are stored. To further calculate gas mixture thermodynamic properties, properties of individual species are stored. For instance, natural gas species' viscosity, critical temperature, critical pressure, and molecular weight are saved for later use. We also collected binary interaction parameters between two species to address the mixture properties. The data is organised in a form that can be easily recalled in the main code.

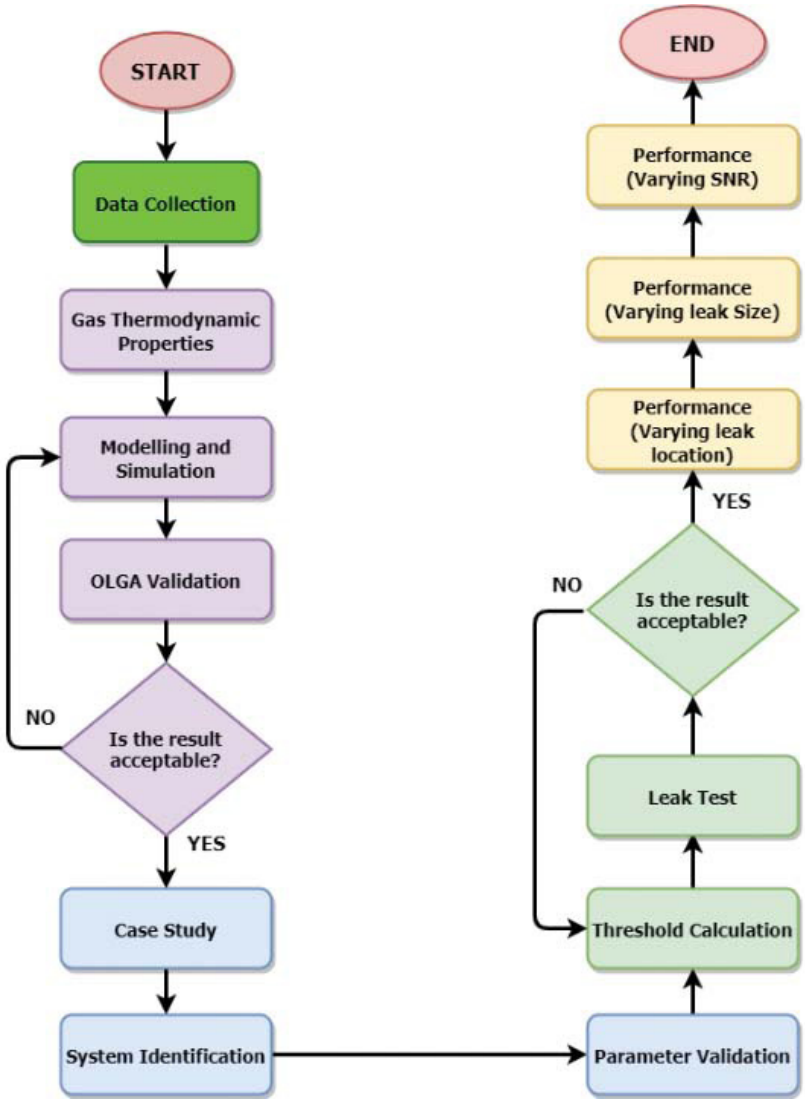

Figure 4.1 Improved Technique for Leak Detection using Data

Coding and Simulation of Equation of State

Equation of state (EOS) is used to estimate thermodynamic parameters of a gas mixture, like viscosity, density, compressibility, thermal conductivity or entropy at different temperature and pressure conditions. It is also helpful in developing the phase envelope of a specified gas