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Geomechanical approach to optimize the management of large diameter pressure pipelines

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Abstract

The management strategies of large diameter pressure water pipelines (at the piece level) are generally based on an expert knowledge. Some of these strategies are hardly formalised and partially meet alignment priorities. In fact, the degradation kinetics for this kind of pipelines are badly known and the numerical models to assess future degradation trends are rarely available. Consequently, some pieces in the main water supply are probably replaced at an early stage whereas others subject to a much higher risk are spared. These aspects bring to acquire a better knowledge of the determinants of the mechanical behaviour of the pipelines in order to optimize the asset management (at the main water supply level). In this paper, the current technological locks that will improve and advance knowledge are firstly discussed. A methodology based on reliability assessment is then presented. The goal is to get the necessary information about the real properties (aging, in-service loading more important,...) of some pieces of a main water supply (for different configurations). This information ('current state') can be then compared to the required performance ('design state') by using mechanical models coupled with probabilistic approaches. Some examples are presented to illustrate this formalism for improving the resources allocated to the maintenance by an effective risk management.