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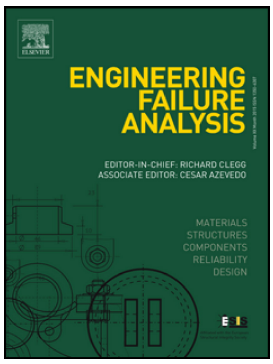


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# Modified response surface method basis harmony search to predict the burst pressure of corroded pipelines

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## Abstract

The accurate burst pressure prediction of pipelines with corrosion defects is important to provide a suitable design of water, oil, and gas pipes networks. Generally, the empirical burst pressure models for corroded pipelines have the narrow limitation for large-verity of steel grades. In this paper, a modified response surface model is proposed based on the novel learning procedure using harmony search algorithm to predict the burst pressure of corroded pipelines with different steel grades named as HS-MRSM. The nonlinear relation as a power and high-order polynomial functions is calibrated using improved harmony search for large experimental corroded pipes more than 572 in HS-MRSM model. The performances for both accuracy and agreement predictions of the HS-MRSM are compared with modified response surface method (MRSM) and existing empirical models using comparative statistics as root mean square error (RMSE), mean absolute error (MAE), the Nash-Sutcliffe Efficiency (NSE), and the Willmott index of agreement (d). The results demonstrated that the proposed HS-MRSM is significantly improved The burst pressure predictions of corroded pipelines compared to best empirical model and MRSM. Generally, the empirical models –based PCORRC format are performed the best predictions among other empirical models.

**Keywords:** Corroded pipelines; Burst pressure prediction; Empirical model; HS-MRSM model.

## 1. Introduction

The use of onshore (underground or aerial) and offshore pipelines as fluids transportation structures has known a significant and continuous evolution in various industrial sectors especially the oil and gas industry, compared to other ways of fluids products transportation.