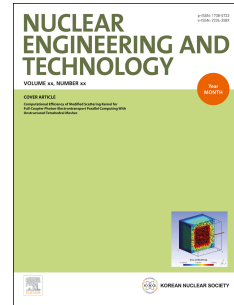


Accepted Manuscript

Effective Numerical Approach to Assess Low-cycle Fatigue Behavior of Pipe Elbows

Heung Woon Jang, Daegi Hahm, Jae-Wook Jung, Jung-Wuk Hong



PII: S1738-5733(17)30552-1

DOI: [10.1016/j.net.2018.01.020](https://doi.org/10.1016/j.net.2018.01.020)

Reference: NET 508

To appear in: *Nuclear Engineering and Technology*

Received Date: 7 September 2017

Revised Date: 22 January 2018

Accepted Date: 30 January 2018

Please cite this article as: H.W. Jang, D. Hahm, J.-W. Jung, J.-W. Hong, Effective Numerical Approach to Assess Low-cycle Fatigue Behavior of Pipe Elbows, *Nuclear Engineering and Technology* (2018), doi: 10.1016/j.net.2018.01.020.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 **Effective Numerical Approach to Assess Low-cycle Fatigue Behavior of Pipe Elbows**

2
3 Heung Woon Jang^a, Daegi Hahm^b, Jae-Wook Jung^a, Jung-Wuk Hong^{a*}

4 Emails: j.hong@kaist.ac.kr; jwhong@alum.mit.edu

5
6 ^a*Department of Civil and Environmental Engineering, Korea Advanced Institute of Science and
7 Technology (KAIST), 291 Daehak-ro, Yuseong-gu, Daejeon 34141, Republic of Korea*

8 ^b*Integrated Safety Assessment Division, Korea Atomic Energy Research Institute (KAERI), 111,
9 Daedeok-daero 989 Beon-gil, Yuseong-gu, Daejeon 34057, Republic of Korea*

10 11 **Abstract**

12 We develop numerical models to efficiently simulate the low cycle fatigue behavior of a pipe elbow. In
13 order to verify the model, in-plane cyclic bending tests of pipe elbow specimens were conducted and a
14 through crack occurred in the vicinity of the crown. Numerical models based on the erosion method and
15 the tie-break method are developed and compared with experimental results. The calculated results of
16 both models are in good agreement with experimental results, and the model using the tie-break method
17 possesses two times faster calculation speed. Therefore, the numerical model based on the tie-break
18 method would be beneficial to evaluate the strength of piping systems under seismic loadings.

19
20 **Keywords** Low-cycle fatigue, fracture, finite element method, pipe elbow

21 22 **1. Introduction**

23 Since the Tohoku earthquake in 2011, the importance of the safety and redundancy of nuclear power plant
24 structures has increased substantially. In the event of a disaster such as an earthquake or a tsunami,
25 coolant must be steadily supplied to the reactor to shut down the plant safely. If the coolant is not

Download English Version:

<https://daneshyari.com/en/article/8083713>

Download Persian Version:

<https://daneshyari.com/article/8083713>

[Daneshyari.com](https://daneshyari.com)