EXPERIMENTAL – DIGITAL IMAGE CORRELATION METHOD AND NUMERICAL SIMULATION OF STANDARD GLOBE VALVE HOUSING

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1. Introduction

Globe valves are one of most commonly used pipeline fittings in the industry and represent a very important functional part. During the operation, globe valves are submitted to different kinds of loadings, depending on their function (internal pressure, thermal loading, axial loading etc). For understanding strain and stress conditions of numerous objects in exploitation, numerical and experimental analysis are often used [1-3]. This paper addressed the case of globe valve under internal pressure. Digital image correlation (DIC) method and software Aramis were used in the experiment for the verification of the globe valve model and further numerical simulation. Several valve models were created and analyzed, and the one that fits best the experimental results is presented.

2. Experimental and numerical results

Finite element analysis (FEA) is used for numerical calculation of displacements, strains and stresses within the globe valve. 3D model of globe valve (Fig.1) is discretized in fine mesh model consisting of 15131 tetraedar finite elements and 49699 nodes.

In Fig. 2, experimental strain field results of the part of the globe valve subjected to 25 bar internal pressure are presented. Fig 2. represents measured report using GOM equipment (ARAMIS system) for 3D optical strain analysis. Fig.3 illustrates the strains (dimensionless, to be multiplied with 100 to obtain percentages) obtained by the finite element analysis. As one can see, differences between experimental and numerical results are negligible.
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4. References

