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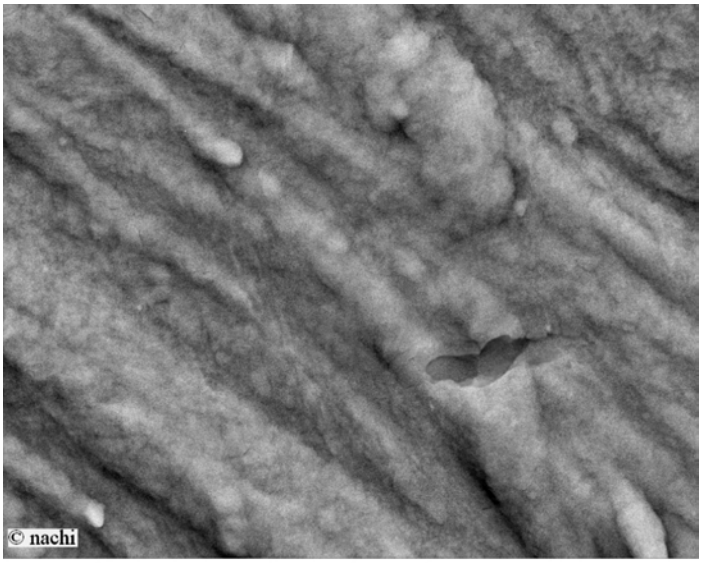

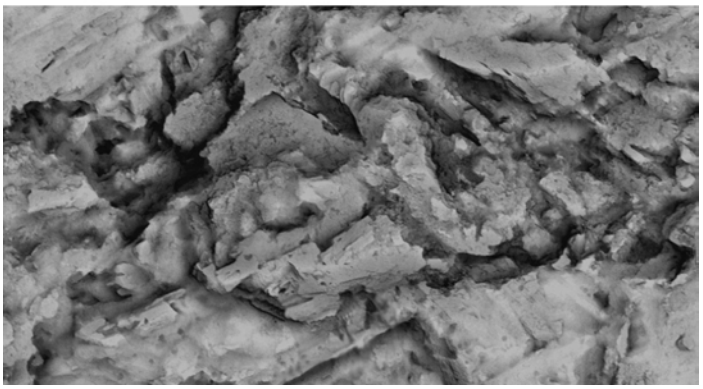

Sudarea şi încercarea Materialelor

ABSTRACTS

Seismic strengthening of masonry using some advanced composite materials

C.S. Dragomir, D. Dobre, E.S. Georgescu

The seismic vulnerability of masonry buildings may be reduced through the increasing of strength and rigidity by reinforcement or confinement. In order to support the provisions of Romanian codes, some modern manufacturing technologies have produced a lot of new composite building materials. The paper presents the theoretical basis of reinforcing masonry with polymer grids and the results of experimental and numerical analysis research on a 3D masonry model with the mechanical performance enhanced by the reinforcement polymer grids.

Prediction of stress distribution of pressure vessel shell using numerical simulation

M. Prvulovic, M. Ristic, S. Budimir, M. Prokolab, Z. Milutinovic

In this paper, a comparative analysis of stresses in the pressure vessel shell, using a numerical simulation in software package CATIA and analytical calculation has been represented. Material of the pressure vessel is stainless steel 304L, and it is intended for substances storing, that have corrosion effect.

Using the finite element method it was performed a modeling of the pressure vessel for a real geometry, where it has been considered a shape of shall and geometry of connections, supports and welded joints, because they might be places for the occurrence of stress concentration.

Based on the analysis results, the highest achieved stresses are in the torus part of the head and around the connections. It was observed a good accordance between the results obtained on the basis of analytical strength calculation, and results of numerical simulation. Shown methodology might have application of stress prediction in the similar industrial equipment.

Spot weld growth on medium carbon steel. Part 2: Servo based electrode actuation system

Nachimani Charde

In the part 1 of this research, the medium carbon steel was welded using pneumatic based electrode actuation system and subsequently it was investigated for the fatigue strength under tensile shear load, hardness and micro structural changes. Similar type of welding conditions and strength tests were conducted in this experiment but the electrode actuation system was replaced by servo based electrode actuation system; instead. A 1.5 kW powered-servo motor and its driving mechanical assembly were electro-fitted as to improve the force profiles before, during and after the welding process takes place. In doing so, the force exertions are systematically distributed and the corresponding changes are analyzed for the welds improvements. As such the specimen sizes and corresponding alignments were kept constant that of the previous experiments had but the welding lobe parameters and force presets were slightly calibrated for. The servo based electrode actuation system improves the electrically generated forging forces during welding process and consequently minimizes the porosity occurrences at the welded region. Specifically the diameters of fused regions were increased for the same welding conditions as compared to part 1 results and therefore the tensile loading force was significantly increased to break the welded joints in this part. However the hardness distributive values were remained approximately the same as compared to the first part because the solidification process is seemed to be happened for the duration. This has been confirmed by the metallurgical study which has revealed that the micro structural orientation in similar fashion for both experiments.

Spot weld growth on medium carbon steel. Part 2: Servo based electrode actuation system

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Keywords

Medium carbon steel, Carbon steel welding, Spot welding of steel, Electrode actuation.

1. Introduction

Force changes during the entire welding process are important parameter to understand as it diminishes the quality of welded regions in terms of fatigue strength. When the pneumatic based and servo based electrode actuation system are separately analyzed, it noticeably varies from the force profiles distribution, particularly at the increment of forging forces during weld cycles [1]. These forging forces are irremovable properties as it was induced due to the high AC current flow. As the welding current movement goes on both direction (positive to negative on half cycle and vice versa) during welding process in AC spot welder; the forging forces do exist significantly in electrical means [2]. This effects, of course, can be reduced by using servo based electrode actuation system with supportive braking system. Literally, the servo based system squeezes the base metals very smoothly and locks the mechanical lever using brakes once it reaches the exact pressing force levels [3]. So the strong hold of base metals during weld cycles have resulted low generation of forging force effect and hence the heat diffusion is significantly improved

Figure 1 and 2 are showing the force profiles of medium carbon steels when welded with pneumatic and servo-based electrode actuation systems, respectively [4].

2. Experimentation

The entire research was carried out using 75 kVA spot welder, powered by AC waveform and capable of handling up to 99 weld cycles in whole. Each cycle consumes 0.2 mS in time scale. Pre and post welding mechanism was available but only single welding current and single welding force (SISF) method was taken into consideration for this paper. The base metals were prepared in rectangular shape metal sheets (200 mm x 25 mm x 2 mm) as used in part 1 before and it has been shown in Fig. 1. The chemical properties are: C = 0.40; Cu = 0.016; Mn = 0.90; P = 0.040; S = 0.050 and Si = 0.006 for medium carbon steel. Hardness was 65 HRB when measured with Rockwell hardness tester on scale 'B' and the truncated-electrode tip was 5 mm diameter which was selected from RWMA's class two (copper and chromium) category.

A pair of test sample was initially placed on the top of lower electrode (tip) of the welder as overlaying 60 mm on each other in lap-joint fashion and then the initiating pedal was pressed. The upper electrode was located at the home position and once the welding process starts, the electrode moves (400 rpm) from home position to base metals' close position with reversed maximum torque. The reverse torque minimizes the position errors of the 50 kg of electrode assembly in free fall. When it

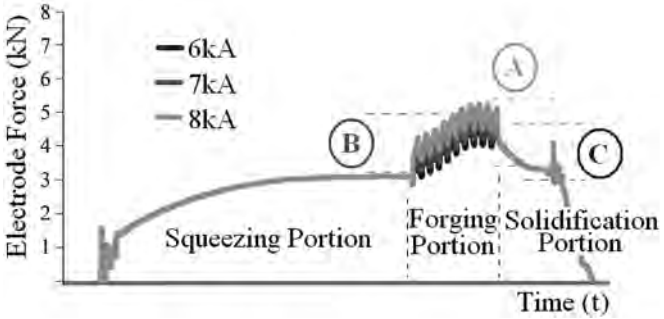

Figure 1. Force profiles of pneumatically driven system for medium carbon steel.

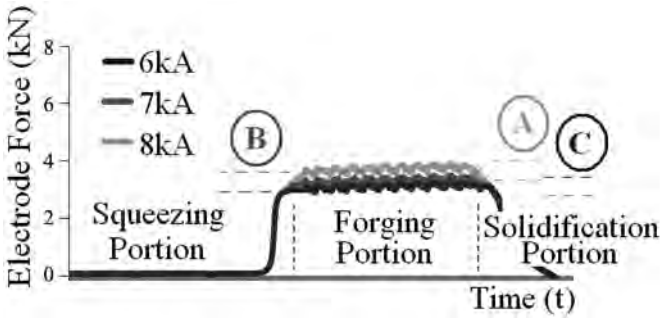

Figure 2. Force profiles of servo driven system for medium carbon steel.

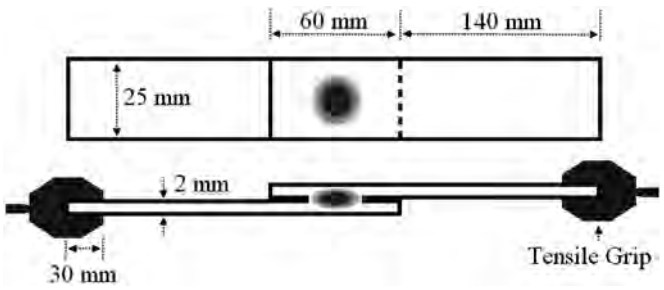

Figure 3. Test sample.

reaches the point 'A', the electrode movement is electrically slowed (50 rpm) as to produce smooth touch between electrodes to sheets. This movement would last until the present value of