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Using a Correction Factor to Remove Machine Compliance in a Tensile Test on DP1000 Steel Validated with 2D Digital Image Correlation Technique

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Authors:

Rohaizat N.I.,
Alharbi K.,
Pinna C.,
Ghadbeigi H.,
Hanlon D.N.,
Azid I.A.

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Abstract:

This paper presents the procedure for the machine compliance removal in the obtained force-displacement data from a tensile test in order to generate a correct stress-strain curve for any material. A tensile test has been conducted on a dual phase steel using an ATSM standard 12.5 mm flat-type tensile specimen geometry and the aim is to produce the correct stress-strain curve without the effect of machine compliance. A correction factor has been developed and is applied to the obtained force-displacement response of the tested DP1000 steel specimen. The strain result obtained from the stress-strain curve with applied machine stiffness correction factor is then validated against the strain result obtained using a virtual strain gauge of digital image correlation (DIC). Strain results obtained from both procedures, through applying correction factor to data and DIC technique are almost similar with a small difference of 0.21%. The implementation of the correction factor procedure in tensile response data are described in this contribution.