

AN APPROACH FOR THE ECONOMIC ASSESSMENT OF POWER QUALITY DISTURBANCES

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ABSTRACT

This paper proposes an approach to assess the economic impact of steady state power quality problems on industrial customers. The main effects of waveform distortion in industrial environment are elevated energy losses, premature aging of equipment, and misoperation of production processes. Premature aging arises from the highly increased thermal stresses on the load equipments, in particular its electrical insulation. Misoperation is attributed to deviation in the electrical environment from the mandatory conditions. This influences the performance of the load equipment and the linked production processes. The associated cost to each of these undesired effects is to be quantified. A method is presented to compute these cost components. The estimated total costs due to power quality violation are to be compared against the cost of power quality correction facilities. This can help in appraising and deciding the economically-effective power quality enhancement mechanisms. Besides, the approach is applied to a representative industrial plant with a mix of linear and nonlinear loads under a variety of operating situations. The economic impact of undervoltage, overvoltage, and harmonic distortion are evaluated.