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Contemplating the influence of electrical process parameters, control scheme and electromechanical phenomenon governing advanced material joining processes

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Examining the electrical and magnetic process parameters influencing the mechanical and metallurgical behavior is imperative for similar and dissimilar material joining process. Numerous researchers have continuously been involved in the detailed analysis of parametric impacts on conventional and advanced material joining processes while trivial research reports are available on electro-magneto aspects significantly governing the outcome. Further, the research reports emphasize the need for extensive investigations to determine the influence of parameters which is viewed from the insight of interdisciplinary functionaries and phenomenon. Hence, in this presentation, an attempt is to be made to explain the experimentally investigations for the globally adaptive manufacturing schema. Experimental trials based on DOE are to be conducted by varying the process parameters which may be electrical, mechanical, metallurgical or chemical. These studies would be made on advanced joining processes viz., Magnetically Impelled Arc Butt Welding (MIAB), Magnetic Pulse Welding (MPW), Ultrasonic Joining, Explosive and Electron Beam Welding. Subsequently, the specimens subjected to any particular process would be tested for its quality and strength based on which a parameter window is likely to be created. Statistical analysis is to be performed for evolving equations which would clearly indicate the interdependencies among the process parameters. Further, Finite Element Analysis employed for analyzing the distribution of current, flux, resistance, conductance and the associative interdisciplinary parameters in the specimens shall be discussed.

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Second order sliding-mode for direct power control of doubly-fed induction generator under dips voltage

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This study proposes a direct power control (DPC) strategy for a grid-connected doubly-fed induction generator (DFIG) with slip power recovery. The control design, based on the second-order sliding modes (SOSM) is adopted to control both converters rotor side converter (RSC) and the grid side converter (GSC) at a fixed switching frequency. The super twisting algorithm is adopted on Low-Voltage-Ride Through (LVRT) scheme for improving the behavior of the DFIG under fault and to smooth the power injected in the grid power. Moreover, the proposed control strategy presents attractive features such as chattering-free behavior (no extra mechanical stress), finite reaching time and robustness with respect to external disturbances (grid) and unmodeled dynamics (generator). The effective of the proposed control strategy is verified by the simulation results of a 200 W DFIG system. Representative results evidence both the high dynamic performance and the superior robustness achieved with proposed control scheme.

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