# Influencing Factors on Low Current TIG Arc Resonance

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**Abstract:** Pulsed arc can refine of fusion zone grain size and substructure, reduce width of heat affected zone (HAZ) and so on. However, the research of pulsed arc physical properties is still blank. To deepen the understanding of pulsed arc physical properties, a test of low current Tungsten Inert Gas (TIG) arc is carried out. It is found that TIG arc is not a first-order inertia system but a second-order oscillation system with its obvious feature. From the results of test, an electrical model is proposed. It is a parallel connection model of resistor, capacitor and inductor (RCL). A transfer function is also deduced. Furthermore, the Influence of the base current and arc length on the arc is researched by changing these parameters and measuring its response to frequency. Using excitation current and response voltage, frequency and impedance on resonance are derived by means of Discrete Fourier transform (DFT). After many combination tests, it shows that along with current increasing, the resonance frequency increases and its impedance decreases; along with arc length increasing, the resonance frequency decreases and its impedance increases. These rules will broaden the knowledge about TIG arc and its resonance, as well as offer a reference to improving quality of welding seam.

**Key words:** Tungsten inert gas arc, discrete Fourier transform, resonance, dynamic impedance

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