Pulsed GMAW 의 전류 파형이 금속이행에 미치는 영향

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Effect of current waveform on drop transfer in pulsed gas metal arc welding

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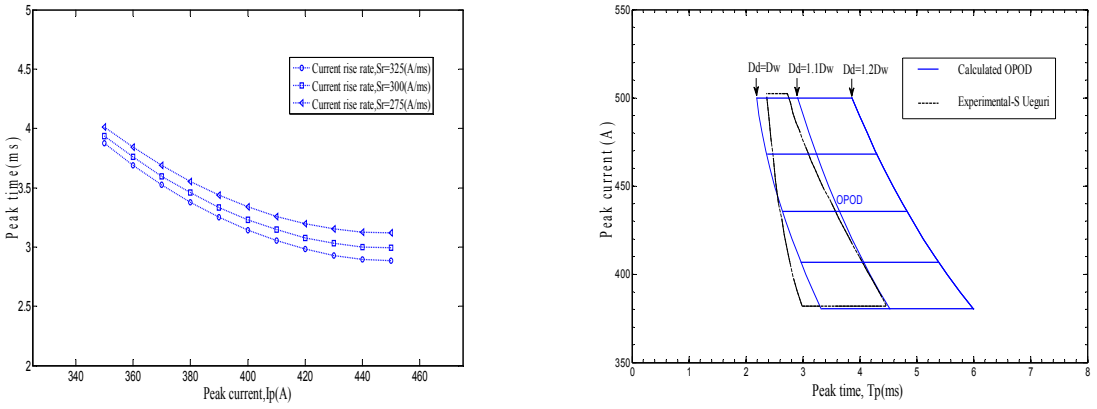
Abract

Conventionally in pulsed gas metal arc welding (GMAW-P), drop transfer is analyzed with simplest square pulse waveform. While the pulse current is described by four parameters (peak current magnitude and time plus base current magnitude and time), it deviates the real pulse shape. Real pulse can be better idealized by the trapezoidal pulse waveform described by two additional parameters, i.e., current rise and fall rate (dI/dt). Power source response rate is described by these parameters. In this work, the effect of these parameters on drop transfer is predicted by the force displacement model (FDM). While peak current has significant effects on drop detachment, drop transfer is also influenced by the current rise rate. Predictions indicate that the current rise rate can have considerable effects on the size of the detached drop if other pulse parameters are kept constant. FDM is applied to determine peak time for one drop one pulse condition (ODOP) when rests of the pulse parameters are given. The predicted range of ODOP shows good agreement with experimental data.

Key words: Pulsed gas metal arc welding, Pulsed current waveform, Drop transfer, One drop one pulse, Response rate, Pulse parameters

Results



(a) (b)

Figure 1. (a) Effect of power source response rate change on peak time for steel wire 1.2mm. (b) Comparison of the predicted range of OPOD with experimental data for 1.2mm steel wire.