DOI: https://doi.org/10.15407/techned2016.03.079

IMPROVING THE EFFICIENCY OF THE ARC COMPONENT OF LASER-ARC DISCHARGE

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	№ 3, 2016 (May/June)
Pages	79 – 81

Authors
O.Bushma[1], V.Sydorets[1], Wu Boyi[2]
[1] – Paton Welding Institute of NAS of Ukraine,
11, K.Malevicha str., Kyiv, 03680, Ukraine,
e-mail: sydorvn@gmail.com
[2] – Chinese-Ukrainian E.O.Paton Welding Institute (Guangdong General Research Institute of Industrial Technology) (Guangzhou Research Institute of Non-Ferrous Metals),
363 Changxing Road, Tianhe, 510650, Guangzhou, China

Abstract

Volt-ampere characteristics of the laser-arc discharge for different rates of absorption of laser radiation of the base metal have been corrected by taking into account in the energy conservation law the additional input power, which determines by interaction of electric arc plasma with the laser radiation. It is shown that along with a increasing the efficiency of the laser component of the heat source, also increases the efficiency of the arc component due to a significant increasing the absorption coefficient of the laser radiation during the transition of the metal in the liquid state. To determine the temperature dependence of the absorption coefficient

of laser radiation by metallic materials the metal under study was considered within the nearly free electron model. In this case, according to the Drude-Zener theory the absorption coefficient is mainly determined by the specific resistance of the metal. References 5, figures 4.

Key words: laser-arc discharge, volt-ampere characteristics, efficiency

Received: 30.01.2016
Accepted: 29.03.2016
Published: 25.04.2016

References

1. Bushma O.I., Sydorets V.N. Quasi-Statical Volt-Ampere Characteristics of the Combined Laser-Arc Discharge. *Tekhnichna elektrodynamika*. Tematychnyi vypusk Sylova elektronika ta enerhoefektyvnist. 2010. Vol. 1. P. 201-204 (Rus.)
2. Khaskin V.Yu., Korzik V.N., Sydorets V.N., Bushma A.I., Wu Boyi, Luo Ziyi. Improving the Efficiency of Hybrid Welding of Aluminum Alloys. *The Paton Welding Journal*. 2015. No 12. P. 14-18. DOI: http://doi.org/10.15407/tpwj2015.12.03
3. Gvozdetsky V.S., Krivtsun I.V, Chizhenko M.I. Laser-Arc Discharge: Theory and Applications. Welding and Surfacing Review. Amsterdam: Harwood Academic Publishers, 1995. Vol. 3. 148 p.
4. Pentegov I.V., Sidorets V.N. Energy Parameters in a Mathematical Model of a Dynamic Welding Arc. *Welding International*. 1990. Vol. 4. Issue 4. P. 272-275. DOI: https://doi.org/10.1080/09507119009447722
5. Shelyagin V.D., Khaskin V.Yu. Tendencies in Development of Laser-Arc Welding (Review). *The Paton Welding Journal.* – 2002. No 6. P. 25-28.

PDF