COMMENT ON "FIELD DISTRIBUTION ALONG A LONGITUDINALLY STREAMLINED ARC IN DC PLASMATRON"*

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In the left side of (4.1) the authors omitted the term $\frac{1}{4}\pi d_a^2$. In (4.5) in the numerator the term d_a, therefore, appears to the -1 power.

Justified criticism has been made of our analysis, since in assuming T_a, σ, d_a to be constants, in accordance with Ohm's law $I=\frac{1}{4}\pi d_a^2\sigma E$, the field intensity must remain constant if the current remains constant. We agree that the assumption $\sigma=\text{const}$ is superfluous. It would be more correct to make the assumption $T_a=\text{const}$, while leaving σ variable. This is valid in the region of sharp variation of $\sigma=f(T_a)$, when a large change of σ corresponds to small change of T_a.

Account for these factors does not lead to any change of the qualitative picture of the voltage increase along the length of the axially blown arc, resulting from temperature increase of the surrounding gas. For example, replacing σ by the parameters appearing in Ohm's law, we find

$$E=\text{const}\,\frac{c_p\mu^{1-m}(T_a-T)\,d_a}{I(d-d_a)}$$

which for $I=\text{const}$, $d_a=\text{const}$, $T_a\approx\text{const}$ yields, as before, increase of E as a result of the large increase of c_p with temperature increase (for dissociating gases).

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