
Michael Hesse, Seiji Zenitani, Masha Kuznetsova, and Alex Klimas

All at: Space Weather Laboratory, Code 674, NASA Goddard Space Flight Center, Greenbelt, Maryland, 20771, USA

The following describes a list of errata in our paper, “A simple, analytical model of collisionless magnetic reconnection in a pair plasma.” It supersedes an earlier erratum. We recently discovered an error in the derivation of the outflow-to-inflow density ratio. Specifically, eqn. (23) contains an erroneous, additional factor of $n_o^{-1}$. This error leads to three changes to subsequent equations, and to quantitative changes in the figures. We regret this error. The correct version of (23) should read:

$$d^2 \left( 1 - n_o \frac{u_i}{u_o} - n_o^2 \gamma - 1 \right) = - \frac{\gamma - 1}{\gamma} p_o \left( \frac{1}{n_o} + n_o \right)$$

(23)

This result changes two additional equations. Eqn. (24) now becomes:

$$1 - n_o \frac{u_i}{u_o} - n_o^2 \frac{\gamma - 1}{\gamma} = - \frac{\gamma - 1}{2\gamma} \left( 1 + n_o^2 \right)$$

(24)

which now leads to a quadratic rather than cubic equation for $n_o$.

$$n_o^2 + \frac{2\gamma}{\gamma-1} n_o - 1 - \frac{2\gamma}{\gamma-1} = 0$$

(26a)
This equation is readily solved analytically:

\[ n_o = -\frac{\gamma}{\gamma - 1} \varepsilon + \left[ \left( \frac{\gamma}{\gamma - 1} \varepsilon \right)^2 + 1 + \frac{2\gamma}{\gamma - 1} \right]^{1/2} \]  \hspace{1cm} (26b)

The subsequent analysis is unchanged. The revision of (26) leads to qualitatively very similar results, and all original conclusions remain valid. The revised figures are shown below.

REFERENCES


Figures and captions

Figure 1 (color online). Reconnection electric field depending on inflow plasma $\beta$ and polytropic index $\gamma$.

Figure 2 (color online). Ratio of outflow and inflow density, depending on inflow plasma $\beta$ and polytropic index $\gamma$. 
Figure 3 (color online). Entropy ratio $p_n\gamma/p_o\gamma$ depending on inflow plasma $\beta$ and polytropic index $\gamma$.

Figure 4 (color online). Diffusion region thickness $d$ depending on inflow plasma $\beta$ and polytropic index $\gamma$. 
Figure 5 (color online). Diffusion region aspect ratio $d/L$ depending on inflow plasma $\beta$ and polytropic index $\gamma$.

![Graph showing diffusion region aspect ratio $d/L$ vs. polytropic index $\gamma$ for different inflow plasma $\beta$.]

Figure 6 (color online). Outflow velocity depending on inflow plasma $\beta$ and polytropic index $\gamma$.

![Graph showing outflow velocity vs. polytropic index $\gamma$ for different inflow plasma $\beta$.]

Figure 7 (color online). Outflow velocity based on outflow density depending on inflow plasma $\beta$ and polytropic index $\gamma$.

![Graph showing outflow velocity based on outflow density vs. polytropic index $\gamma$ for different inflow plasma $\beta$.]
Figure 8 (color online). Inflow energy flux densities for upstream $\beta=0.3$.

Figure 9 (color online). Outflow energy flux densities for upstream $\beta=0.3$. 
Figure 10 (color online). Outflow kinetic energy flux density plotted versus enthalpy flux density for all parameters. The lower fluxes are obtained for larger values of the polytropic index $\gamma$, with the exception of the $\beta=1$ calculation. Here, lower values of $\gamma$ yield larger kinetic energy but lower enthalpy flux densities.

Figure 11 (color online). Outflow Poynting flux density plotted versus enthalpy flux density for all parameters. Here higher Poynting fluxes are obtained for smaller values of the polytropic index $\gamma$, again with the exception of the $\beta=1$ calculation. Here, lower values of $\gamma$ yield larger kinetic energy but lower enthalpy flux densities.