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Erratum: "On the variational approach to axisymmetric magnetohydrodynamic equilibria" [Phys. Plasmas 15, 092108 (2008)]

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In the description of the variational approach of Sec. II of this paper, there are few errors in the equations presented due to a mistaken transcription. In detail, the second equation of the system (1) of our paper, i.e., the ideal magnetohydrodynamic momentum equation for a perfectly conductive medium, has a wrong sign in the Lorentz term. The correct form is

$$\frac{\partial \mathbf{v}}{\partial t} = -\nabla\left(\frac{v^2}{2}\right) + \mathbf{v} \times (\nabla \times \mathbf{v}) - \rho^{-1}\nabla p + \frac{\rho^{-1}}{4\pi}(\nabla \times \mathbf{B}) \times \mathbf{B}. \tag{1}$$

Moreover, in the first equation of the set of flux functions (4), a factor 4π is missing. The right expression is

$$F(\psi) = 4\pi\chi' = 4\pi\rho v_p/B_p. \tag{2}$$

Last and most important, a term and a geometric factor are missing in the left hand side of the generalized Grad–Shafranov equation, Eq. (5) of our paper. The correct expression is

$$\begin{aligned} &r^2\nabla\cdot\left[\left(1-\frac{F^2}{4\pi\rho}\right)\frac{\nabla\psi}{r^2}\right] + \frac{FF'}{4\pi\rho}|\nabla\psi|^2 \\ &\quad = -4\pi r^2\rho(J' + rv_\phi G') - (H + rv_\phi F)(H' + rv_\phi F') \\ &\qquad + \frac{4\pi r^2}{\gamma-1}\rho^\gamma I', \end{aligned} \tag{3}$$

which can also be written as in Ref. 1 in the form

$$\begin{aligned} &\left(1-\frac{F^2}{4\pi\rho}\right)\left[r^2\nabla\cdot\left(\frac{\nabla\psi}{r^2}\right)\right] - F\nabla\left(\frac{F}{4\pi\rho}\right)\cdot\nabla\psi \\ &\quad = -4\pi r^2\rho(J' + rv_\phi G') - (H + rv_\phi F)(H' + rv_\phi F') \\ &\qquad + \frac{4\pi r^2}{\gamma-1}\rho^\gamma I'. \end{aligned} \tag{4}$$

These mistakes concern the formal side of the expressions, the analysis of the variational approach, the boundary conditions, and the discontinuous solutions has been carried out on the correct and well known form of these equations. The same is true for the numerical solution of the problem that allows us to validate the numerical procedure described in Sec. V of our paper.

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