Erratum: Zonal Flows in Tokamak Plasmas with Tororidal Rotation
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In the above cited Letter, there is an error of sign in Eq. (6). This error affects the conclusion of the Letter.

The statement ''zonal flows become linearly unstable in a rotating system,'' which repeatedly appeared in the abstract, in the third paragraph on the first page, in the third paragraph on the third page, and in the second paragraph in the right column of the third page, should be corrected as ''in the low-collisionality limit, an equilibrium toroidal rotation flow (ETRF) does not affect the low-frequency branch of zonal flows (ZFs); in the high-collisionality limit, ZFs oscillate with a finite frequency in a rotating system, and the frequency of ZFs increases with the toroidal rotation Mach number; when the toroidal rotation speed is comparable to the sound speed, the frequency of ZFs is comparable to the frequency of sound waves (SWs) and it becomes sensitive to q value.''

The statement ''an equilibrium toroidal rotation flow (ETRF) reduces the geodesic acoustic mode (GAM) frequency,'' which repeatedly appeared in the abstract, in the second paragraph on the third page, and in the third paragraph in the right column of the third page, should be corrected as ''the GAM frequency increases with the toroidal rotation Mach number.''

The statement ''in a rotating system, sound waves (SWs) and GAMs can propagate in the poloidal direction,'' which repeatedly appeared in the abstract, in the first paragraph and the fourth paragraph in the right column of the third page, should be modified to ''SWs, GAMs, and ZFs can propagate along the poloidal direction in a rotating system.''

Specifically, the original Letter should be corrected as follows.

The abstract should read ''Zonal flows in tokamak plasmas with toroidal rotation are theoretically investigated. It is found that sound waves (SWs), geodesic acoustic modes (GAMs), and zonal flows (ZFs) can propagate in the poloidal direction in a rotating system while they are poloidal standing waves in a nonrotating system. The frequency of GAMs and the frequency of the ZFs increase with the toroidal rotation Mach number.''

''ZFs are linearly stable and the GAMs are standing waves'' in the first sentence of the second paragraph should be replaced by ''ZFs and GAMs are standing waves.''

''ZFs become linearly unstable'' in the second line of the third paragraph should be replaced by ''ZFs''.

The corresponding equations, which are labeled according to the original Letter, should be replaced by the following equations.

$$\rho_0 = N(\psi)m_i \exp\left[\frac{m_i \omega_T^2 R^2}{2T(\psi)}\right], \tag{6}$$

$$\partial_t \rho_1 + \left(1 + \gamma \frac{\omega_T^2 R^2}{c_s^2}\right)\frac{2\bar{\rho}_0}{R_0}v_E \sin\theta + \frac{\bar{\rho}_0}{qR_0}\partial_\theta v_\parallel = 0, \tag{15}$$

$$\partial_t p_1 - c_s^2 \partial_t \rho_1 - 2(\gamma - 1)\omega_T^2 R_0 \bar{\rho}_0 v_E \sin\theta = 0, \tag{18}$$

$$-i\omega\rho_{1,s} + \frac{2\bar{\rho}_0}{R_0}\left(1 + \gamma\frac{\omega_T^2 R_0^2}{c_s^2}\right)v_E - \frac{\bar{\rho}_0}{qR_0}v_{\parallel,c} = 0, \tag{19a}$$

$$-i\omega p_{1,s} + i\omega c_s^2 \rho_{1,s} - 2(\gamma - 1)\omega_T^2 R_0 \bar{\rho}_0 v_E = 0, \tag{19c}$$

$$\Omega\left(\Omega^2 - \frac{1}{q^2}\right)\left[\Omega^4 - 2\left(1 + \frac{1}{2q^2} + 2M_T^2 + \frac{\gamma}{2}M_T^4\right)\Omega^2 + \frac{\gamma - 1}{q^2}M_T^4\right] = 0, \tag{20}$$

$$\Omega_{GAM}^2 = 1 + \frac{1}{2q^2} + 2M_T^2 + \frac{\gamma}{2}M_T^4 + \left[\left(1 + \frac{1}{2q^2} + 2M_T^2 + \frac{\gamma}{2}M_T^4\right)^2 - \frac{\gamma - 1}{q^2}M_T^4\right]^{1/2}, \tag{22}$$
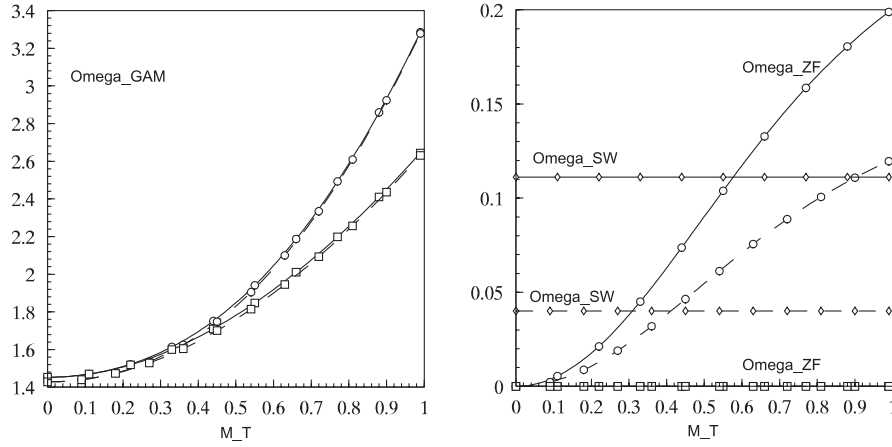
FIG. 1.   Effects of toroidal rotation Mach number on the GAM frequency and the ZF frequency. Solid lines: $q = 3$; dashed lines: $q = 5$. ○: $\gamma = 5/3$; □: $\gamma = 1$ (a) GAM frequency. (b) ZF frequency.

$$\Omega_{\text{ZF}}^2 = 1 + \frac{1}{2q^2} + 2M_T^2 + \frac{\gamma}{2}M_T^4 - \left[\left(1 + \frac{1}{2q^2} + 2M_T^2 + \frac{\gamma}{2}M_T^4 \right)^2 - \frac{\gamma - 1}{q^2}M_T^4 \right]^{1/2}. \tag{23}$$

Equations (24), (25) should be removed.

The second paragraph from the bottom of the second page should read "The normalized GAM frequency $\Omega_{\text{GAM}}(q, M_T)$ and the normalized ZF frequency $\Omega_{\text{ZF}}(q, M_T)$ for fixed values of q are shown in Fig. 1. When $M_T = 0$, Eqs. (22) and (23) recover the previous results [$\Omega_{\text{GAM}}^2 = 2 + 1/q^2$, $\Omega_{\text{ZF}}^2 = 0$] [2, 4]."

Figure 1 should also be corrected.

The second and the third paragraph of the third page should be replaced by "From Eq. (22) and Fig. 1(a), we see that an ETRF increases the GAM frequency and the GAM frequency increases with the toroidal rotation Mach number. From Eq. (23) and Fig. 1(b), we see that in the low-collisionality limit an ETRF does not affect the low-frequency branch of zonal flows; in the high-collisionality limit, ZFs oscillate with a finite frequency in a rotating system, and the frequency of ZFs increases with the toroidal rotation Mach number. When the toroidal rotation speed is comparable to the sound speed, ZF frequency is comparable to the SW frequency and it becomes sensitive to q value."

Equations (26)–(28) in the original Letter should be replaced by

$$\left(\frac{\rho_{1,c}}{\rho_{1,s}} \right)_{\text{SW}} = -i\left(\frac{1}{2}M_T + \frac{1}{M_T} \right), \tag{24}$$

$$\left(\frac{\rho_{1,c}}{\rho_{1,s}} \right)_{\text{GAM}} = \frac{-iM_T\Omega_{\text{GAM}}/(2q)}{(1 + \gamma M_T^2)\Omega_{\text{GAM}}^2 - (\gamma - 1)M_T^2/q^2}, \tag{25}$$

$$\left(\frac{\rho_{1,c}}{\rho_{1,s}} \right)_{\text{ZF}} = \frac{-iM_T\Omega_{\text{ZF}}/(2q)}{(1 + \gamma M_T^2)\Omega_{\text{ZF}}^2 - (\gamma - 1)M_T^2/q^2}. \tag{26}$$

"From Eqs. (26)–(28)" in the last line of the first paragraph in the right column of the third page, should be replaced by "From Eqs. (24), (25)." "SWs and GAMs" in the last line of the first paragraph in the right column of the third page, should be replaced by "SWs, GAMs, and ZFs."

The second, third, and fourth paragraph in the right column of the third page should be replaced by "In summary, we have theoretically investigated zonal flows in tokamak plasmas with toroidal rotation. It is found that the frequency of GAMs and the frequency of ZFs increase with the toroidal rotation Mach number. When the toroidal rotation speed is comparable to the sound speed, ZF frequency is comparable to the SW frequency and it becomes sensitive to q value. It is also found that SWs, GAMs, and ZFs can propagate along the poloidal direction while they are poloidal standing waves in a nonrotating system."

Reference [10] in the original Letter should be removed.

The author apologizes for any inconvenience brought to the readers and the editors.

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