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# CORRIGENDUM

## Nonlinear equilibrium and stability analysis of rippled, partially neutralized, magnetically focused electron beams

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After giving a higher-order solution of the equation describing the nonlinear equilibrium of rippled electron beams, in the second part of the paper we derived mathematical expressions for the growth rates of electrostatic perturbations for the resonant coupling of (i) fast and slow and (ii) fast–fast or slow–slow waves. Actually, viewed from a physical point of view, *only type* (*i*) *of wave coupling may lead to the kind of instability considered in the paper.**

Indeed, in the stability analysis, based on a WKB approximation, we considered the waves supported by the rippled beam to have wavenumbers given by a uniform beam dispersion relation but varying in space ($z$ direction) according to the local value of the plasma frequency. Now for the unrippled beam, in both long and short wave-length limits, the dispersion relation is formally identical to that corresponding to a uniform beam of infinite radial extension. (The finite-radius effect appears in the effective-reduced-plasma frequency, $\omega_{q0}$). Thus, the unrippled beam supports two equal-amplitude space charge waves with wavenumbers

$$(k_z)^f_s = \omega/V_z \pm \omega_{q0}/V_z. \tag{1}$$

*Type* (*i*) *coupling*. The two waves (1) beat together to form a resultant wave, namely

$$\tilde{E}_z = 2E_0\{\cos(\omega_{q0}/V_z)\,z\}\{\cos[\omega t - (\omega/V_z)\,z]\}. \tag{2}$$

The resulting wave envelope represents a standing wave envelope of wavenumber $\omega_{q0}/V_z$ and is describable by a Helmholtz-type equation

$$d^2\tilde{E}_z/dz^2 + (k_z^{sf})^2\,\tilde{E}_z = 0, \tag{3}$$

where $k_z^{sf} = \frac{1}{2}(k_z^s - k_z^f)$. Next, following the WKB procedure indicated above, using a Taylor expansion about $k_z^{sf}$ one obtains

$$\{k_z^{sf}(z)\}^2 \simeq \omega_{q0}(1+\bar{\delta}\cos k_S z), \tag{4}$$

where $k_S$ and $\bar{\delta}$ are the ripple wavenumber and relative amplitude, respectively. Upon substitution of (4), (3) was solved by a resonant-coupling method and the results for type (i) coupling reported in the paper were obtained.

* The same comment holds also for the results presented in Cuperman & Petran (1981 *a*, *b*).

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*Type (ii) coupling.* The $f$–$f$ ($s$–$s$) type of coupling implies the existence of a fast (slow) forward wave and a fast (slow) backward wave which are eigensolutions of the fluid + Poisson equations describing the rippled beam system. If both forward and backward space charge waves existed, the formal results obtained for type (i) (i.e. $s$–$f$) coupling would apply directly to type (ii) coupling. However, unlike the case of a *stationary* plasma, no backward space charge waves are supported by infinitely long *streaming* systems (e.g. electron beams). Thus, we conclude that in the case of infinitely long, rippled electron beams in vacuum, only type (i) unstable coupling must occur.

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