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editorial

At one of the social functions of the 1981 Intermag Conference, Grenoble, a well-known figure in the field of magnetic recording approached the editors of this publication and, with a mischievous smile remarked "Magnetic Separation? - H grad H and you've said it all!"

Well, of course, it is an easy matter to trivialise the most complex of topics in physical science and a light-hearted remark of the above sort would soon be forgotten but for the fact that only recently it has been shown, rather elegantly, that H grad H does not, in fact, completely describe the magnetic traction force density. At least not always.

Dr. M. Takayasu and co-workers at Purdue (IEEE Trans on Magnetics, Vol MAG-20, (1984) 155) and more recently, at M.I.T. (Digests of the 1984 Intermag Conference, IEEE publication No. CH 1918 - 2/84/0000-AA-01/$00.75) have reminded us that for particles for which the volume susceptibility, χ, is not a constant, but a field dependent quantity $\chi(H)$ the magnetic traction force may be expressed as the sum of two quantities, the first of which is of the 'normal' form H grad H, the second of which is expressible in terms of a spatial gradient (gradχ) of the susceptibility.

This more complex form of the dipolar force had already been described elsewhere - for example by Nesset and Finch (Proceedings of the 1978 Engineering Foundation Conference on Industrial Applications of Magnetic Separation, Rindge, N.H.

(IEEE Publication No. 78 CH 1447-2MAG (1979) p188)) - using an algorithmic form for $\chi(H)$ (= $\chi_\infty + \sigma_0/H$). What is particularly interesting here is the way in which the phenomenon of a spatial susceptibility gradient has been used to conceive a new and potentially valuable class of magnetic separator.

We conclude, therefore, that H grad H does not say it all.