Laser Acceleration Using Plasmoids in RF Wells*, A.I. DZERGACH and V.S. KABANOV, Moscow Radiotechnical Institute; A.M. SESSLER and J.S. WURTELE, Lawrence Berkeley National Laboratory - The laser acceleration of plasmoids [1] is investigated theoretically. Preliminary studies show that this configuration, which is based on the forced oscillations of finite pieces of plasma contained in moving rf wells, has very much simplified plasma physics compared to that of other plasma-based ion acceleration schemes. It is necessary to consider the case when the applied electric field, E, of frequency w, is large, $E \leq ec\ rw$, where r is the Classical electron radius and when the plasma density, n, is high, $n \leq w^2/rc^2$. Realization of this proposal requires development, amongst other things, of biresonant accelerating systems including oversized single-mode resonators and the connection of this power tube to terawatt FELs. If these problems, which will be delineated, are overcome--and progress in optics gives one reason to believe they can be--then gradients of 10 GeV/m can be attained. Preliminary design of a linac, based upon this proposal, are presented.

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[1] A.I. Dzergach et al, Theoretical Study of Plasmoid Acceleration in Electromagnetic Potential HF Wells, Proceedings of the Fourth European Particle Accelerator Conference, V. Suller and Ch. Petit-Jean-Genaz, editiors, World Scientific, Singapore, p.811; A.I. Dzergach, On Some Schemes of Laser Accelerators Using Plasmoids in High-Frequency Wells, ibid p. 814.