First Comprehensive Tunnel Diode Survey

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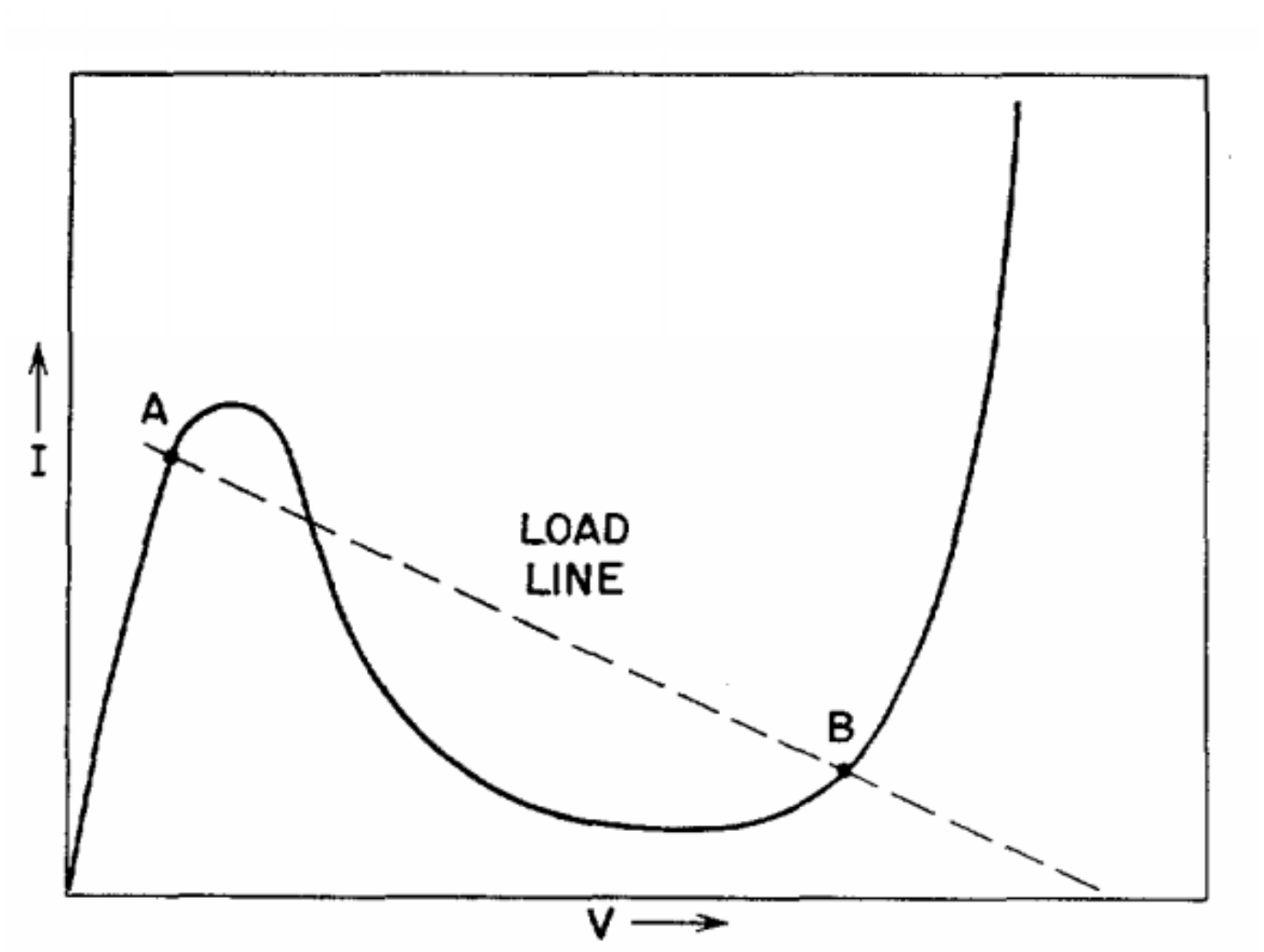

Properties of Esaki (Tunnel) Diodes: A Survey

THE TUNNEL DIODE was discovered by Esaki Leona ("Leo" Esaki) while studying the properties of very low breakdown voltage Zeners. Quantum-mechanical tunnelling across a pn junction between two degenerately doped regions yields the characteristic of the above figure, which includes a negative resistance. The right side of the curve converges to a conventional forward diode characteristic. With a negative resistance thought to persist to ~1THz, tunnel diodes were soon to displace transistors in applications that ran the gamut from microwave amplifiers to supercomputers. However, the lack of unilateral amplification, compounded by serious reliability problems in early devices, limited the tunnel diode to niche applications. Total worldwide consumption is now estimated at perhaps a few thousand devices annually.

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