EE5920 Graduate Seminar in Power/Energy Systems
2:00 pm, Thursday, February 12, 2009  EERC 214

Presentation by Ted Anderson, MSEE Student
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"A Dc-Dc Buck-Boost Converter for Improved Utilization of Alkaline Batteries"

Abstract – Many portable electronic devices such as digital cameras typically use one or more alkaline cells. Battery manufacturer specifications and end-of-life battery voltage measurements indicate that over half of the cell capacity remains when the voltage drops to the point where some devices cease to operate. The sloping discharge characteristic of an alkaline cell prevents such devices from using a significant portion of the cell energy.

This presentation discusses a dc to dc buck-boost converter that will utilize more of the battery capacity by supplying the energy to the load at a constant voltage as the battery voltage drops. The question reduces to a maximum power transfer problem. As battery performance declines with use, there is a point at which the open-circuit battery voltage and internal resistance fail to allow sufficient power transfer. The presentation describes the procedure used to obtain actual terminal voltage data from 1.5V alkaline AA batteries as well as the simple source and load models for the converter resulting from this data. A simulated system is described in which an ideal (lossless) dc-dc buck-boost converter is inserted between the input (battery source) and the output (camera load).

The motivation for further study is discussed in view of the preliminary simulation results and the constraints imposed on the system by fundamental battery limitations and load requirements.

The presenter:

Ted Anderson graduated from Michigan Tech with a BSEE in 1970, after which he worked in a small local corporation, with primary responsibility for the design and manufacture of strain gage and weighing system instrumentation. He has held his present position as a full-time instructor in the School of Technology since 1984. His primary interest is in low-level signal measurement and electronic instrumentation with a more recent focus on power electronics.