

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering and Computer Science

6.334 Power Electronics

Issued: April 31, 2007

Problem Set 10

Due: May 7, 2007

Reading: KSV Chapter 4

Problem 10.1

Consider a continuous conduction mode buck converter to be operated under peak current mode control. The converter parameters are $f_{sw} = 500$ kHz, $L = 16$ μ H, $C = 800$ μ F, and $V_{out,ref} = 24$ V. What is the smallest magnitude of compensating ramp that will yield stable dynamics for the ripple instability over an input voltage range of 36 V $< V_{in} < 75$ V?

Note: Models for computing the ripple dynamics will be discussed in class. They can also be found in: H. Hsu, A. Brown, L. Rensink, and R.D. Middlebrook, "Modeling and Analysis of Switching dc-to-dc Converters in Constant-Frequency Current-Programmed Mode," 1979 IEEE Power Electronics Specialists Conference, pp. 284-301, and in R.W. Erickson, Fundamentals of Power Electronics, Boston: Kluwer, 1997, Chapter 11 (Current Programmed Control).

Problem 10.2 KSV Prob. 4.6

Problem 10.3 KSV Prob. 4.7

Problem 10.4 KSV Prob. 4.8