

Modulated Current Drive Measurements*

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Accurate measurements of the non-inductive current profiles are a key component in controlling the plasma current profile for many applications. A new measurement approach is presented here, where the driven rf current profile is found directly from the periodic response of the motional Stark effect (MSE) signals to a slow modulation of the rf current drive source (the bootstrap current profile can be similarly measured). This is analogous to measuring the rf power deposition profile by measuring the electron temperature response to a fast modulation of the rf power. For measuring the current drive profile, a Fourier transform of the poloidal magnetic flux diffusion equation is used to analyze the MSE signals. The analysis of the modulated current drive is especially simple if the plasma profiles are constant in time, as can be achieved using a push/pull setup where co- and counter-injecting rf sources at the same deposition location alternate during each cycle so that the total heating power remains constant with time. Examples of this measurement technique will be shown using modulated ECCD discharges from DIII-D.

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