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High-rep-rate Thomson scattering for LHD[1] D. J. DEN HARTOG, M. T. BORCHARDT, D. J. HOLLY, O. SCHMITZ, Univ of Wisconsin-Madison, R. YASUHARA, I. YAMADA, H. FUNABA, M. OSAKABE, T. MORISAKI, National Institute for Fusion Science (Japan) — A high-rep-rate pulse-burst laser system is being built for the LHD Thomson scattering (TS) diagnostic. This laser will have two operating scenarios, a fast-burst sequence of 15 kHz rep rate for at least 15 ms, and a slow-burst sequence of 1 kHz for at least 50 ms. There will be substantial flexibility in burst sequences for tailoring to experimental requirements. This new laser system will operate alongside the existing lasers in the LHD TS diagnostic, and will use the same beamline. This increase in temporal resolution capability complements the high spatial resolution (144 points) of the LHD TS diagnostic, providing unique measurement capability unmatched on any other fusion experiment. The new pulse-burst laser is a straightforward application of technology developed at UW-Madison, consisting of a Nd:YAG laser head with modular flashlamp drive units and a customized control system. Variable pulse-width drive of the flashlamps is accomplished by IGBT (insulated gate bipolar transistor) switching of electrolytic capacitor banks. Direct control of the laser Pockels cell drive enables optimal pulse energy extraction, producing >1.5 J q-switched pulses with ˜20 ns FWHM. Burst operation of this laser system will be used to capture fast time evolution of the electron temperature and density profiles during events such as ELMs, RMP perturbations, and various MHD modes.

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