Schematic diagram of a diesel-electric locomotive is shown in the Figure. For a particular rate of fuel injection, the diesel engine is developing a constant power of 1 MW at a speed of 6000 rpm. The rating of both the dc generator and the dc motor is 1000 V, 6000 rpm, 1500 A and each one is having armature resistance of 0.02 Ω. Rated flux is maintained for the dc the motor driving the wheel. Determine φg as a percentage of its rated value so that the locomotive can develop a torque of 2000 Nm. Find also the speed at which the driving motor will run. Neglect rotational losses of the system. Treat the dc machines as dc motors while determining the machine constant i.e. Keφ.

