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Advanced Divertor Design and Application under Modern Superconducting Tokamak Constraints[1] BRENT COVELE, MIKE KOTSCHENREUTHER, SWADESH MAHAJAN, PRASHANT VALANJU, University of Texas at Austin — With current ITER projections already predicting divertor exhaust heat loads in the 5-10 MW/m^2 range, i.e. at the maximum tolerance, it is clear that the divertor heat load problem will only be exacerbated for future superconducting tokamaks, as well as perhaps some modern tokamaks today. Thus, an advanced divertor, such as the X-Divertor (XD), Super-X Divertor (SXD), or Snowflake (SF) will become a virtual necessity to reduce incident heat flux at the target plates. Using the 2D magnetic equilibrium code CORSICA, we explore the possibilities of creating an advanced divertor for a next-generation superconducting tokamak (I_p = 15 MA, B_T = 5.3 T, R = 6.2 m) under nominal engineering constraints. Advanced divertors were achieved with no in-vessel PF coils, PF current densities below 30 MA/m^2, and vertical maintenance access, all of which are favorable conditions for tokamaks today. Both the XD and SF divertors are readily achievable while maintaining core plasma performance, and the advantages and disadvantages of each are discussed in turn. Some thought is given as to how the divertor cassette will need to be modified to accommodate advanced divertors.

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