

ARIES-RS Divertor System Selection and Analysis

C.P.C. Wong,¹ E. Chin,¹ T.W. Petrie,¹ E.E. Reis,¹ M.Tillack,² X. Wang,²
I. Sviatoslavsky,³ S. Malang,⁴ D.K. Size⁵

¹General Atomics, San Diego, California, USA

²University of California, San Diego, La Jolla, California, USA

³University of Wisconsin, Madison, Wisconsin, USA

⁴Forschungszentrum Karlsruhe GmbH, Karlsruhe, Germany

⁵Argonne National Laboratory, Argonne, Illinois, USA

Abstract

The ARIES-RS divertor system is selected and analyzed. A radiative divertor approach using Ne as the radiator is chosen to reduce the maximum heat flux to $<6 \text{ MW/m}^2$. A 2-mm W layer is used to withstand surface erosion allowing a design life close to 3 full-power-years. This W coating on the V-alloy structure is castellated to meet structural design limits. A detailed description of the calculated heat flux distribution, thermal-hydraulics, structural analysis, fabrication methods and vacuum system design are presented. An innovative design using adjustable bolts is utilized to support the divertor plates, withstand disruption loads and allow adjustment of alignment between plates. With the exception of the concentration of Ne at the divertor, it is found that this divertor system design can satisfy all the design criteria and most of the functional requirements specified by the project.