

Developments on High Pressure Two Phase Flow Measurement Techniques

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Abstract

AREVA operates a world-wide unique thermal hydraulic platform to ensure high safety standards in the nuclear industries. This platform is operated as an accredited test and inspection body according to ISO 17025 and 17020 to grant a high and independently confirmed quality standard. The accreditation also ensures the independency of the organization and confidentiality to the individual stakeholders, as for example research centers, utilities, components suppliers, engineering companies and vendors. The aim of the tests is to demonstrate the reliability of components and systems – mainly under operational or accidental conditions. In addition to that it is also the aim of the tests to increase the understanding of the fluid dynamic processes. Especially under operational conditions it is very difficult to gain local measurement data. This paper gives an overview of the current developments of these measurement techniques focused on the local void fraction measurements in an annulus as an example for AREVA's strategy in the field of advanced two-phase flow measurement techniques.

With increasing requirements with respect to the local resolutions the efforts for measurement techniques increase as well. For that purpose AREVA has built up a specific test loop to develop measurement techniques and which is therefore not linked to production measurements. Within this loop it is possible to adjust water/steam properties representative for operational and accident conditions of LWRs. This loop has been used to develop a procedure to measure the void fraction distribution in an annulus representing the hydraulic diameter of a typical LWR core sub-channel. This paper describes the process, which has been established to reach reliable local high resolution measurements.

Keywords: local void measurements, advanced two phase flow measurements, components qualification, systems testing

1. INTRODUCTION

AREVA has been operating a worldwide unique testing and qualification infrastructure for more than 35 years, which is mainly delegated to systems and components of light water reactors [1]. AREVA has opened this Thermo-Hydraulic Platform for partners within the power plant industries, among which are authorities, research centers, component-suppliers, utilities and/or engineering companies. To ensure our partners a high quality of test and qualification standards AREVA's platform is accredited as flexible test laboratory according to ISO 17025 and as independent inspection body according to ISO 17020. The International Laboratory Accreditation Cooperation (ILAC) has settled an almost worldwide cooperation agreement, according to which the associated countries accept each other's accreditations. According to

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