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## Unsteady aspects of sodium-water reaction

Sofia Carnevali

University of Compiegne, France

Sodium fast reactors are one of the most promising nuclear reactor concept in the future. One important issue of these reactors is the reactivity of metallic sodium and its exothermal reaction with water. It is extremely important to clarify the phenomenology and identify hazardous situations since available knowledge does not allow a robust extrapolation to full scale plants. The objective of this work is so to identify and assess the details of the phenomenology, especially at the sodium/water interface, to isolate the leading mechanisms and issue a robust and innovative modelling approach. A state of the art is proposed, starting from available experimental data and present perception of the physics. Some important results are discovered and analysed from experiments performed by the French CEA. Among the principal phenomena identified so far are rapid water vaporization, hydrogen emission and explosion in air. A series of tests are also run as support of this work to better investigate kinetic aspects of reaction and complete the overall understanding. Present modelling approaches are analysed and applied to experimental results. One based on thermodynamic equilibrium and the second one based on the theory of explosions, these methods have severe shortcomings and are not completely backed up with a precise knowledge of the phenomenology. A new modelling strategy, based on the physic of phenomena is so proposed. Model will be able to prevent energetic consequence and better extrapolate results to full scale plants.

## Biography

Sofia Carnevali has completed his PhD at the age of 29 years from the University of Compiegne in chemical and energetic engineering. She is a PhD research engineer in thermo hydraulics at the CEA, Paris, France. She has won two awards for her research results from the nuclear SFEN society and from the Chemical EFCE organisation. She has published 1 paper in Chemical Engineer Journal and she is waiting for 2 others papers in Nuclear and Design Journal.

[sofia.carnevali@gmail.com](mailto:sofia.carnevali@gmail.com)