## Abstract

### Contributii la studiul termohidraulicii accidentelor severe in reactorii nucleari

Teza isi propune sa ofere o imagine de ansamblu in ceea ce priveste accidentele nucleare in principalele filiere de reactori. Accentul este pus pe imbunatatirea capabilitatilor de analiza ale codurilor de calcul din domeniu prin implementarea unor solutii de analiza ce faciliteaza evaluarea scenariilor tarzii de degradare a zonei active. Pe langa imbunatatirea capabilitatilor codului de sistem RELAP/SCDAPSIM COUPLE, a fost implementat un model ECM care permite analiza 3D in premiera pentru tipul de reactor CANDU 6. Aceste metode de evaluare utilizand codurile de sistem sau analizele CFD sunt potrivite pentru analiza probabilistica a unui accident nuclear de nivel 2 (PSA nivel 2), insa in cazul real in care solutiile de mitigare a distrugerii barierelor de securitate nu s-a putut realiza cu succes, apare necesitatea utilizarii unui cod de calcul care poate evalua modul in care se deplaseaaza efluentii radioactivi si poate estima efectele in zona de dispersie. Acest lucru a fost realizat prin testarea unui program de calcul care a fost dezvoltat in cadrul unui proiect amplu. Pentru a putea furniza date cu acuratete ridicata referitoare la conditiile meteorologice cat si valori masurate in teren, a fost necesara realizarea unei platforme mobile modulare, care detine la bord o serie de echipamente ce permit masurarea dozelor locale cat si a datelor meteo, care beneficieaza de posibilitatea transmiterii datelor la distanta.

### Contributions to the study of thermal hydraulics of severe accidents in nuclear reactors

The aim of the thesis is to provide a comprehensive image of nuclear power plants severe accidents phenomenology. The accent was on developing new options and capabilities for computer codes, that can address the beyond design accident conditions, where severe core damage is already done. The author had made several modifications to RELAP/ SCDAPSIM COUPLE computer code, and implemented an effective convectivity model (ECM), that enhances the 3D analysis of CANDU 6 reactor core. These methods that use system codes, or CFD evaluation of nuclear accidents, are suited for the probabilistic safety assessment level 2 (PSA level 2), but in the real case of an accident in which the abnormal event had happened, a tool that can model the radioactive dispersion is needed. This was done by testing a computer code developed during a project. But to be able to feed the correct data in the software, you need reliable information, so I needed to develop a mobile modular platform, that can process meteorological data and local dose measurements, that can share the date if needed remotely.