Title (EN): **Parallel realization of computer simulation of fire in structures with high concentration of visitors**

Title (SK)**: Paralelná realizácia počítačovej simulácie požiaru v objekte s vysokou koncentráciou návštevníkov**

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Scientific projects: VEGA 2/0165/17

Annotation: The use of the FDS (Fire Dynamics Simulator) system for modelling of fires in large structures with complex geometry requires parallel computation on a high-performance computer. However, it is necessary to solve the problem of inaccuracies caused by parallelization which occur during calculation. To obtain new knowledge about efficient realization of fire simulation without un-proportional loss of accuracy simulation of chosen scenarios of fire in cinema hall were realized. The cinema hall was selected by specialists on fire safety as a structure with high safety demands due to high concentration of visitors and risk of casualties and large damage. The impact of fire simulation parallelization and computational mesh resolution on the calculation efficiency and accuracy was studied. Methodology of the simulation parallelization with regard to accuracy and its efficient realization on high-performance multicore computer was described. The ability of FDS to realistically model the fire behaviour and danger to visitors was demonstrated.

Main scientometric outputs:

1. VALÁŠEK, Lukáš - GLASA, Ján. On realization of cinema hall fire simulation using Fire Dynamic Simulator. In Computing and informatics, 2017, vol. 36, no. 4, p. 971-1000. (0.488 - IF2016). (2016 - Current Contents). ISSN 1335-9150. Typ: ADDA
2. VALÁŠEK, Lukáš. Počítačová simulácia priebehu požiarov a analýza ich dôsledkov. Dizertačná práca (PhD.). Bratislava: Ústav informatiky SAV, 2016. 146 p. Typ: DAI
3. VALÁŠEK, Lukáš. Computer simulation of course of fire and their consequences. In Information sciences and technologies: Bulletin of the ACM Slovakia, 2017, vol. 9, no. 1, p. 40-48. ISSN 1338-1237. Typ: ADFB