Department of Civil and Environmental Engineering

POLITECNICO DI MILANO

Seminars organized by the DICA Scientific Commission
VII cycle – Academic Year 2019/20

Wednesday, July 22, 2020

Microsoft Teams, 11.00 a.m.

Francesco Lo Monte

Concrete Structures in Fire:

Effects of Indirect Actions and Explosive Spalling

Fire and high temperature represent severe loading conditions for strategic infrastructures such as tunnels, this making of primary importance the proper evaluation of their fire performance. High temperature, in fact, is detrimental to the structural behaviour due to both the decay of mechanical properties and the influence of indirect actions. In particular, very high maximum temperatures can be reached in tunnels, even higher than 1000°C for the most severe scenarios.

Thanks to incombustibility and thermal insulation capability, concrete can generally guarantee satisfactory mechanical behaviour even at high temperature, provided that the cover keeps its integrity. However, spalling phenomenon, namely the violent detachment of shards from the exposed face, can lead to the direct exposure of reinforcing bars to the flames, thus dramatically speeding up the loss of bearing capacity. In order to reduce spalling risk in spalling-sensitive structures, a key role is played by the screening of concretes through testing in the design phase.

In the seminar a brief overview on the above-mentioned topics will be given, starting from the behaviour of concrete exposed to fire, and then moving to the structural behaviour focusing also on the role of fire spalling and finally concluding with a real case application.