**UNIVERSITÀ DEGLI STUDI DI GENOVA**
**Dottorato di Ricerca in Ingegneria Civile, Chimica e Ambientale**

# *PhD Seminars*

11/12/2015 at 15:00 - Room A12

## *Mathematical models of the vitreous humor and vitreous substitutes dynamics in the vitreous chamber of the eye*

***Krystyna Isakova***


## Abstract

In this work at first we investigate the motion of vitreous humor in the eye during eye rotations, with the aim to understand the generation of vitreoretinal tractions. We consider the case of normal eyes as well as eyes with different pathologies, such as vitreous humour liquefaction, vitreoschisis and focal vitreoretinal tractions. The main objective of the models presented is to obtain a better understanding of the stress generation and how results change when viscoelasticity is accounted for, which applies to the case of the natural healthy vitreous.

Typically, tamponade fluids used during vitrectomy, a surgery aimed to treat retinal detachment, are hydrophobic. Owing to this property a layer of aqueous humour invariably forms between the retina and the vitreous substitute. The shape of the interface between the vitreous substitute and aqueous humor is highly curved. This affects the region of the retina effectively tamponated. During eye rotations the existance of a thin layer of aqueous has important mechanical implications, both ofthe stresses experienced on the retina and also for possible occurance of instability of the interface between the two fluids that might initiate the process of interface breakdown, eventually leading to emulsification. In this work we present mathematical models that help us shedding some light onto these problems.