סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה׳ 04.02.21 (כ״ב בשבט, תשפ״א), בשעה 13:45 באמצעות הזום :

https://technion.zoom.us/j/99066211584

מרצה : נטע-לי יעקובזון.

מנחה : פרופ״ח רנה ואן האוט

על הנושא:

Pollen Entrainment and Deposition Characteristics in the Vicinity of Pine Cones

The seminar will be given in Hebrew

תקציר ההרצאה :

Release and capture of wind dispersed pollen by pine trees is considered to be an ineffective mechanism. However, since pine trees are one of the most ancient trees on earth, one may ask if pine trees enhanced wind pollination and thereby gained an evolutionary advantage that enabled them to survive so long? Two contradicting views are found in the literature regarding pine tree pollination, favoring (i) conspecific pollen capture as a result of vortices generated by the cone, and (ii) inertial deposition. This study was aimed to gain insight into pollen dispersion, flow field dynamics and pollen entrainment/deposition in the vicinity of ovulate pine cones during pollination, and in particular, to better understand the influence of pine cone morphology. To accomplish this, advanced techniques such as stereoscopic microscopy, micro CT, particle image velocimetry (PIV) and digital inline holographic cinematography were employed. Using 2D-PIV and holography (3D), pollen were tracked in the vicinity of an ovulate pine cone. Measurements were performed in a windtunnel and a water channel. Effects of relative humidity (RH) on ovulate pine cone's morphological features such as porosity, roughness and shape were estimated in addition to pollen characteristics. Several freshly picked ovulate pine cones were investigated at Reynolds numbers ranging between $210 < Re_D < 955$. In addition, the flow field downstream of a model rough cone, as well as a rough and smooth sphere were measured. Flow fields around pine cones with and without dispersed pollen were measured and compared to available data on spheres, cylinders and spheroids. Average wake lengths plotted versus RH increased with RH due to changing cone morphology. Similar to spheres, as Re_D increased, two vortex shedding frequency branches appeared, i.e. a low and a high one associated with large-scale and small-scale vortices, respectively. Measured pollen trajectories indicated that within the investigated Re_D range, inertia governs pollen deposition and most are deposited on the ovulate pine cone's windward side. Only at the lowest Re_D (<265) for which pollen have Stokes numbers ranging between $0.42 < St < 0.52$, few pollen were entrained into the wake and moved towards the leeward side of the cone. 3D pollen tracks indicated that when pollen were entrained into the recirculating wake region, they underwent strong 3D movement and no deposition on the leeward side of the cone was observed. In conclusion, this study supports the finding that pollen deposition is governed by inertia.

בברכה,

פרופ״ח אתי סאס

מרכז הסמינרים