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NUMERICAL MODELLING OF BIRD STRIKE ON A ROTATING ENGINE BLADES BASED ON VARIATIONS OF POROSITY DENSITY

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A numerical investigation is conducted on a rotating engine blade subjected to a bird strike impact. The bird strike is numerically modelled as a cylindrical gelatine with hemispherical ends to simulate impact on a rotating engine blade. Numerical modelling of a rotating engine blade has shown that bird strikes can severely damage an engine blade, especially as the engine blade rotates, as the rotation causes initial stresses on the root of the engine blade. This paper presents a numerical modelling of the engine blades subjected to bird strike with porosity implemented on the engine blades to investigate further damage assessment due to this porosity effect. As porosity influences the decibel levels on a propeller blade or engine blade, the damage due to bird strikes can investigate the compromise this effect has on the structural integrity of the engine blades. This paper utilizes a bird strike simulation through an LS-Dyna Pre-post software. The numerical constitutive relations are keyed into the keyword manager where the bird 's SPH density, a 10 ms simulation time, and bird velocity of 100 m/s are all set. The blade rotates counterclockwise at 200 rad/s with a tetrahedron mesh. The porous regions or voids along the blade are featured as 5 mm diameter voids, each spaced 5 mm apart. The bird is modelled as an Elastic-Plastic-Hydrodynamic material model to analyze the bird 's fluid behavior through a polynomial equation of state. To simulate the fluid structure interaction, the blade is modelled with Johnson-Cook Material model parameters of aluminium where the damage of the impact can be observed. The observations presented are compared to previous study of a bird strike impact on non-porous engine blades. © 2022. IIUM Engineering Journal. All Rights Reserved.

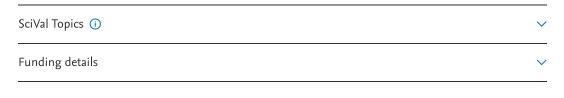
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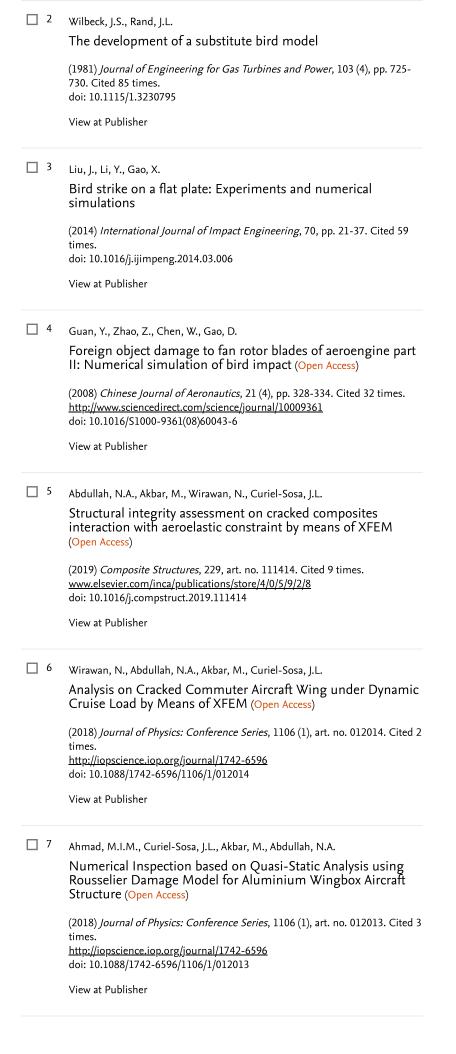


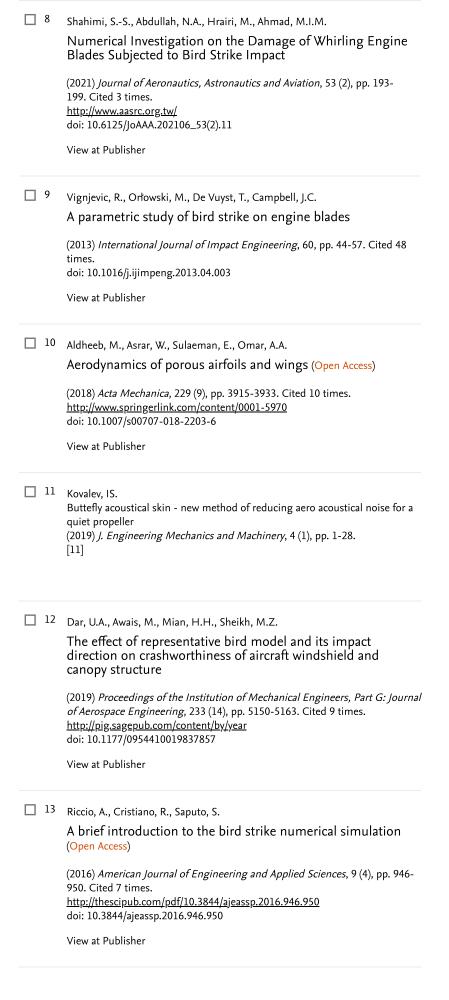
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