Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Laurence Giraud-Moreau Given names :

Status (prof., assistant prof., …) :

Laboratory : UR LASMIS Website address :

Institution : UTT Website address :

Scientific competence of the supervisor:

Optimization of 3d infill structure produced by Fused Deposition Modeling (FDM) by using remeshing methods

Two major publications in the field proposed for the PhD :

1. Madugula, S.K.; Giraud-Moreau, L.; Adragna, P.-A.; Daniel, L. Infill Design Reinforcement of 3 Printed Parts Using Refinement Technique Adapted to Continuous Extrusion. J. Manuf. Mater. Process. 2021, 5, 71.
2. Madugula S., Giraud-Moreau L., Adragna P.-A., Renforcement de la structure interne de pièces imprimées par extrusion en continu par une technique de remaillage, 14ème Colloque National en Calcul des Structures,

Website address of the personal page :

Supervisor's email : laurence.moreau@utt.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** VI.1

Title : Optimization of 3D infill structure produced by fused deposition modeling by using remeshing methods and optimization procedures

Subject :

3D printing is an alternative manufacturing process that is particularly well adapted to unitary, low series or complex inner shape parts. This process is a solution for local and on demand production and is well adapted to personal and individual parts where no specific tool is necessary. Among the actual 3D printing processes, FDM process (Fused Deposition Modeling) is the most affordable and distributed. S. Madugula (phd student in the UR Lasmis, 2018-2022) developed a numerical tool to optimize the infil structure of 2,5D printed parts produced by the FDM process. When such a part is subjected to external loading, not all the infill regions will experience the same amount of stress. Therefore, using uniform infill throughout the part is not the most optimised solution in terms of material usage. S. madugula developed methodologies based on remeshing techniques coupled to Finite Element simulation (FE simulation) to control the internal structure of the part. These methodologies allow to reinforce the infilll design of the 2D part in the area where the mechanical strength must be improved and decrease the amount of material used to reduce the printing time. The aim of this thesis is to continue this research work and extend the methodology to the 3D case. Optimization strategies will be implemented in order to define the position of nodes en reinforce the infill design.

Keywords :

FDM, 3d printing, remeshing, optimization

Expected collaborations :

Background required from the applicant :

knowledges in numerical simulation and matlab

Existence of a PDF file detailing the proposal ("yes" or "no") : yes

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