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Critical current evaluation of Nb3Sn samples from m(B) curves by SEM image processing in ANSYS APDL using Space Claim import tools

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In the framework of the studies on high field magnets for future accelerators, a specific project called ASTRACT, involving INFN, CNR/SPIN, ENEA and the University of Genoa, is focused on the effect of transverse strain on the critical current of Nb_3Sn wires. The first phase of the project concerns the effects of strain imposed on Nb_3Sn wires before heat treatment and the development of a procedure to compare direct critical current measurements with the values extracted by magnetization cycles. At this purpose we developed a protocol that starts from a SEM image and load it in the Space Claim suite, thanks to a CAD file format. Then the image can be converted in Ansys Neutral File and imported in ANSYS Mechanical APDL. By this way we can perform numerical integration over any bundle surface to calculate the magnetic moment shape factor useful to extract the critical current value from magnetization curves. Furthermore, this technique can lead straightforward to 2D or 3D strand models to realize mechanical or electromagnetic simulations.

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