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AC LOSSES MODELS FOR LOW-TC SUPERCONDUCTORS

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AC losses still represent an important heating source when operating superconducting magnets. This is even more the case when powering-up the superconducting magnet, even at DC currents. We have developed new methods to evaluate the heat produced by ac losses during powering procedures of superconducting magnets. These include the Bean model assuming the penetration in a cylindrical form, and also an approach with parabolic penetration, and general exponential penetration of the magnetic field (four sub-models). We then compare all the models between themselves and also with the classical models (Bean – flat and Wilson approach).

3D simulations were done for all the models considering several study cases for Nb₃Sn and NbTi. These cases were selected bearing in mind the design options of a high to moderated field superconducting magnet (being designed for a new separating device), namely operating at 9T, 10T, 12T and 8T, 9T, 10T, respectively. All the models seem appropriate to describe the losses.

Primary author: AUGUSTO, Paulo (APLICAMA Research Group - Univ Salamanca - SPAIN)

Co-authors: Prof. ESTÉVEZ, Angel (APLICAMA Research Group, Departamento de Ingeniería Química y Textil, Fac. de Ciencias Químicas, Universidad de Salamanca); Prof. BARBOSA, Domingos (LEPAE, Departamento de Engenharia Química, Faculdade de Engenharia da Universidade do Porto); Dr AUGUSTO, Pedro (Science Manager, Faculty of Medicine of the University of Porto); Prof. CASTELO-GRANDE, Teresa (LEPAE, Departamento de Engenharia Química, Faculdade de Engenharia da Universidade do Porto)

Presenter: AUGUSTO, Paulo (APLICAMA Research Group - Univ Salamanca - SPAIN)

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