cases	doc_1		doc_2		decision	id
			authors		DUPLICATES	989
			title	Legolas: a modern tool for magnetohydrodynamic spectroscopy		
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			urls	• https://arxiv.org/pdf/2010.14148v2.pdf • https://github.com/n-claes/legolas		
			id	id4622097825882961l4		
			abstract	Magnetohydrodynamic (MHD) spectroscopy is central to many astrophysical disciplines, ranging from helio- to asteroseismology, over solar coronal (loop) seismology, to the study of waves and instabilities in jets, accretion disks, or solar/stellar atmospheres. MHD spectroscopy quantifies all linear (standing or travelling) wave modes, including overstable (i.e. growing) or damped modes, for a given configuration that achieves force and thermodynamic balance. Here, we present Legolas, a novel, open-source numerical code to calculate the full MHD spectrum of one-dimensional equilibria with flow, that balance pressure gradients, Lorentz forces, centrifugal effects and gravity, enriched with non-adiabatic aspects like radiative losses, thermal conduction and resistivity. The governing equations use Fourier representations in the ignorable coordinates, and the set of linearised equations are discretised using Finite Elements in the important height or radial variation, handling Cartesian and cylindrical geometries using the same implementation. A weak Galerkin formulation results in a generalised (non-Hermitian) matrix eigenvalue problem, and linear algebraic algorithms calculate all eigenvalues and corresponding eigenvectors. We showcase a plethora of well-established results, ranging from p- and g-modes in magnetised, stratified atmospheres, over modes relevant for coronal loop seismology, thermal instabilities and discrete overstable Alfv\'en modes related to solar prominences, to stability studies for astrophysical jet flows. We encounter (quasi-)Parker, (quasi-)interchange, current-driven and Kelvin-Helmholtz instabilities, as well as non-ideal quasi-modes, resistive tearing modes, up to magneto-thermal instabilities. The use of high resolution sheds new light on previously calculated spectra, revealing interesting spectral regions that have yet to be investigated.		
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	authors	• Niels Claes • Jordi De Jonghe • Rony Keppens				
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	abstract					
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